

---

**PART J-1**  
**WORKING SURFACES, GUARDING FLOORS AND WALL OPENINGS, LADDERS**

WAC

296-24-735	Walking-working surfaces.
296-24-73501	General requirements.
296-24-73505	Aisles and passageways.
296-24-73507	Covers and guardrails.
296-24-73511	Steam pipes.
296-24-750	Guarding floor and wall openings and holes.
296-24-75001	Terms.
296-24-75003	Protection for floor openings.
296-24-75005	Protection for wall openings and holes.
296-24-75007	Protection of open-sided runways.
296-24-75011	Railing, toeboards, and cover specifications.
296-24-765	Fixed industrial stairs.
296-24-76501	Terms.
296-24-76503	Application of requirements.
296-24-76507	Stair strength.
296-24-76509	Stair width.
296-24-76511	Angle of stairway rise.
296-24-76513	Stair treads.
296-24-76515	Length of stairways.
296-24-76519	Vertical clearance.
296-24-76521	Open risers.
296-24-76523	General.
296-24-76555	Alternating Tread-Type Stairs.
296-24-780	Portable wood ladders.
296-24-78003	Application of requirements.
296-24-78005	Materials.
296-24-78007	Construction requirements.
296-24-78009	Ladder tests.
296-24-795	Portable metal ladders.
296-24-79501	Terms.
296-24-79503	Requirements.
296-24-79505	Testing.
296-24-810	Fixed ladders.
296-24-81001	Definitions.
296-24-81003	Design requirements.
296-24-81005	Specific features.
296-24-81007	Clearance.
296-24-81009	Special requirements.
296-24-81011	Pitch.
296-24-81013	Maintenance and use.
296-24-855	Other working surfaces.
296-24-85501	Dockboards (bridge plates).
296-24-85503	Forging machine area.
296-24-85505	Veneer machinery.

---

**WAC 296-24-735 Walking-working surfaces.**

[Order 73-5, § 296-24-735, filed 5/9/73 and Order 73-4, § 296-24-735, filed 5/7/73.]

**WAC 296-24-73501 General requirements.** This section applies to all permanent places of employment, except where domestic, mining, or agricultural work only is performed. Construction work is not to be deemed as a permanent place of employment. Measures for the control of toxic materials are considered to be outside the scope of this section.

[Statutory Authority: RCW 49.17.010, [49.17].050 and [49.17].060. 95-22-015, § 296-24-73501, filed 10/20/95, effective 1/16/96. Statutory Authority: Chapter 49.17 RCW. 94-06-068 (Order 93-17), § 296-24-73501, filed 3/2/94, effective 3/1/95; Order 73-5, § 296-24-73501, filed 5/9/73 and Order 73-4, § 296-24-73501, filed 5/7/73.]

**WAC 296-24-73505 Aisles and passageways.**

- (1) Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repairs, with no obstruction across or in aisles that could create a hazard.
- (2) Permanent aisles and passageways shall be appropriately marked. Appropriate does not limit the marking to printed lines on the floor only. Other appropriate methods may be marked pillars, powder stripping, flags, traffic cones, or barrels, provided they are maintained in good repair and the recognition of such markings are included in the training programs for vehicle operators and employees.
- (3) All trestles in connection with industrial plants on which cars run, which are also used as walkways for workers, shall be equipped with a walkway on the outer edge, so located as to give safe minimum clearance of three feet to cars. Such walkways shall be equipped with standard rails. Where a trestle crosses a driveway or passageway the trestle over such points shall be solidly boarded over.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-73505, filed 7/20/94, effective 9/20/94; 89-11-035 (Order 89-03), § 296-24-73505, filed 5/15/89, effective 6/30/89; Order 73-5, § 296-24-73505, filed 5/9/73 and Order 73-4, § 296-24-73505, filed 5/7/73.]

**WAC 296-24-73507 Covers and guardrails.**

- (1) All open vats and tanks into which workers may fall shall be guarded with railings or screen guards.
- (2) All open vats and tanks where workers are employed shall have a platform or walkway 36 to 42 inches below the top of vat or tank or where walkway is flush with top of vat or tank, a standard safeguard of 36 to 42 inches high shall be constructed.
- (3) Every tank over 5 feet deep, excepting where agitators are used or where products may be damaged by ladders, shall have a ladder fixed on the inside so placed as to connect with means of access from the outside. Rungs shall have a clearance of at least 6 inches measured between the rung and the side of the tank.

[Statutory Authority: RCW 49.17.040, 49.17.150, and 49.17.240. 79-08-115 (Order 79-9), § 296-24-73507, filed 7/31/79; Order 74-27, § 296-24-73507, filed 5/7/74; Order 73-5, § 296-24-73507, filed 5/9/73 and Order 73-4, § 296-24-73507, filed 5/7/73.]

**WAC 296-24-73511 Steam pipes.**

- (1) All steam pipes or pipes heated by any other means to a sufficient temperature to burn a person (other than coil pipes, radiators, for heating rooms or buildings, or pipes on portable steam engines and boilers) and which are within seven feet of a floor or platform, if exposed to contact, shall be guarded with a standard safeguard.

---

**WAC 296-24-73511 (Cont.)**

- (2) Protection from hot pipes. All exposed hot pipes within seven feet of the floor or working platform, or within 15 inches measured horizontally from stairways, ramps or fixed ladders, shall be covered with an insulating material or be guarded in such a manner as to prevent contact.

[Order 74-27, § 296-24-73511, filed 5/7/74.]

**WAC 296-24-750 Guarding floor and wall openings and holes.**

[Order 73-5, § 296-24-750, filed 5/9/73 and Order 73-4, § 296-24-750, filed 5/7/73.]

**WAC 296-24-75001 Terms.** The following terms shall have the meaning ascribed in this section, when referred to in WAC 296-24-75003 through 296-24-75011, unless the context requires otherwise.

- (1) **Floor hole.** An opening measuring less than 12 inches but more than 1 inch in its least dimension, in any floor, platform, pavement, or yard, through which materials but not persons may fall; such as a belt hole, pipe opening, or slot opening.
- (2) **Floor opening.** An opening measuring 12 inches or more in its least dimension, in any floor, platform, pavement, or yard, through which persons may fall; such as a hatchway, stair or ladder opening, pit, or large manhole. Floor openings occupied by elevators, dumb waiters, conveyors, machinery, or containers are excluded from this part.
- (3) **Handrail.** A single bar or pipe supported on brackets from a wall or partition, as on a stairway or ramp, to furnish persons with a handhold in case of tripping.
- (4) **Platform.** A working space for persons, elevated above the surrounding floor or ground; such as a balcony or platform for the operation of machinery and equipment.
- (5) **Runway.** A passageway for persons, elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between buildings.
- (6) **Standard railing.** A vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of person.
- (7) **Standard strength and construction.** Any construction of railings, covers, or other guards that meets the requirements of WAC 296-24-750 through 296-24-75011.
- (8) **Stair railing.** A vertical barrier erected along exposed sides of a stairway to prevent falls of persons.
- (9) **Toeboard.** A vertical barrier at floor level erected along exposed edges of a floor opening, wall opening, platform, runway, or ramp to prevent falls of materials.
- (10) **Wall hole.** An opening less than 30 inches but more than 1 inch high, of unrestricted width, in any wall or partition; such as a ventilation hole or drainage scupper.
- (11) **Wall opening.** An opening at least 30 inches high and 18 inches wide, in any wall or partition, through which persons may fall; such as a yard-arm doorway or chute opening.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-75001, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-75001, filed 5/9/73 and Order 73-4, § 296-24-75001, filed 5/7/73.]

---

**WAC 296-24-75003 Protection for floor openings.**

- (1) Every ladderway floor opening or platform shall be guarded by a standard railing with standard toeboard on all exposed sides (except at entrance to opening), with the passage through the railing either provided with a swinging gate or so offset that a person cannot walk directly into the opening.
- (2) Every hatchway and chute floor opening shall be guarded by one of the following:
  - (a) Hinged floor opening cover of standard strength and construction equipped with standard railings or permanently attached thereto so as to leave only one exposed side. When the opening is not in use, the cover shall be closed or the exposed side shall be guarded at both top and intermediate positions by removable standard railings.
  - (b) A removable railing with toeboard on not more than two sides of the opening and fixed standard railings with toeboards on all other exposed sides. The removable railings shall be kept in place when the opening is not in use and should preferably be hinged or otherwise mounted so as to be conveniently replaceable.

Where operating conditions necessitate the feeding of material into any hatchway or chute opening, protection shall be provided to prevent a person from falling through the opening.
  - (c) The area under floor openings shall, where practical, be fenced off. When this is not practical, the areas shall be plainly marked with yellow lines and telltales shall be installed to hang within five and one-half feet of ground or floor level.
  - (d) Where floor openings are used to drop materials from one level to another, audible warning systems shall be installed and used to indicate to employees on the lower level that material is to be dropped.
- (3) Every skylight opening and hole shall be guarded by a standard skylight screen or a fixed standard railing on all exposed sides.
- (4) Every pit and trapdoor floor opening, infrequently used, shall be guarded by a floor opening cover of standard strength and construction which should be hinged in place. While the cover is not in place, the pit or trap opening shall be constantly attended by someone or shall be protected on all exposed sides by removable standard railings.
- (5) Every manhole floor opening shall be guarded by a standard manhole cover which need not be hinged in place. While the cover is not in place, the manhole opening shall be constantly attended by someone or shall be protected by removable standard railings.

[Order 74-27, § 296-24-75003, filed 5/7/74; Order 73-5, § 296-24-75003, filed 5/9/73 and Order 73-4, § 296-24-75003, filed 5/7/73.]

**WAC 296-24-75005 Protection for wall openings and holes.**

- (1) Every wall opening from which there is a drop of more than 4 feet shall be guarded by one of the following:
  - (a) Rail, roller, picket fence, half door, or equivalent barrier.

The guard may be removable but should preferably be hinged or otherwise mounted so as to be conveniently replaceable. Where there is exposure below to falling materials, a removable toeboard or the equivalent shall also be provided. When the opening is not in use for handling materials, the guard shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening with its center approximately 4 feet above floor level and of standard strength and mounting.

---

**WAC 296-24-75005 (Cont.)**

- (b) Extension platform onto which materials can be hoisted for handling, and which shall have side rails or equivalent guards of standard specifications.
- (2) Every chute wall opening from which there is a drop of more than 4 feet shall be guarded by one or more of the barriers specified in WAC 296-24-75005 (1)(a) and (b), or as required by the conditions.
- (3) Every window wall opening at a stairway landing, floor, platform, or balcony, from which there is a drop of more than 4 feet, and where the bottom of the opening is less than 3 feet above the platform or landing, shall be guarded by standard slats, standard grill work (as specified in WAC 296-24-75011(11)), or standard railing.

Where the window opening is below the landing, or platform, a standard toeboard shall be provided.

- (4) Every temporary wall opening shall have adequate guards but these need not be of standard construction.
- (5) Where there is a hazard of materials falling through a wall hole, and the lower edge of the near side of the hole is less than 4 inches above the floor, and the far side of the hole more than 5 feet above the next lower level, the hole shall be protected by a standard toeboard, or an enclosing screen either of solid construction, or as specified in WAC 296-24-75011(11).

[Order 73-5, § 296-24-75005, filed 5/9/73 and Order 73-4, § 296-24-75005, filed 5/7/73.]

**WAC 296-24-75007 Protection of open-sided runways.**

- (1) Railings must be provided with a toeboard wherever, beneath the open sides,
  - (a) Persons can pass,
  - (b) There is moving machinery, or
  - (c) There is equipment with which falling materials could create a hazard.
- (2) Every runway shall be guarded by a standard railing (or the equivalent as specified in WAC 296-24-75011(3) on all open sides 4 feet or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard shall also be provided on each exposed side.

Runways used exclusively for special purposes (such as oiling, shafting, or filling tank cars) may have the railing on one side omitted where operating conditions necessitate such omission, providing the falling hazard is minimized by using a runway of not less than 18 inches wide. Where persons entering upon runways become thereby exposed to machinery, electrical equipment, or other danger not a falling hazard, additional guarding than is here specified may be essential for protection.

- (3) Regardless of height, runways above or adjacent to dangerous equipment, pickling or galvanizing tanks, degreasing units, and similar hazards shall be guarded with a standard railing and toeboard.

[Order 76-6, § 296-24-75007, filed 3/1/76; Order 73-5, § 296-24-75007, filed 5/9/73 and Order 73-4, § 296-24-75007, filed 5/7/73.]

**WAC 296-24-75011 Railing, toeboards, and cover specifications.**

- (1) A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of from thirty-six to forty-two inches nominal from upper surface of top rail to floor, platform, runway, or ramp level and:
  - (a) The top rail shall be smooth-surfaced throughout the length of the railing.

---

**WAC 296-24-75011 (Cont.)**

- (b) The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp.
  - (c) The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.
  - (d) Guardrails with heights greater than 42 inches are permissible provided the extra height does not create a dangerous situation for employees and that additional mid-rails were installed so that openings beneath the top rail would not permit the passage of a 19-inch or larger spherical object.
- (2) A stair railing shall be of construction similar to a standard railing but the vertical height shall be not more than thirty-four inches nor less than thirty inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.
- (3) Minimum requirements for standard railings under various types of construction are specified in this subsection. Dimensions specified are based on the U.S. Department of Agriculture Wood Handbook, No. 72, 1955 (No. 1 (S4S) Southern Yellow Pine (Modulus of Rupture 7,400 p.s.i.)) for wood; ANSI G 41.5-1970, American National Standard Specifications for Structural Steel, for structural steel; and ANSI B 125.1-1970, American National Standard Specifications for Welded and Seamless Steel Pipe, for pipe.
- (a) For wood railings, the posts shall be of at least two-inch by four-inch nominal stock spaced not to exceed six feet; the top and intermediate rails shall be of at least two-inch by four-inch nominal stock. If top rail is made of two right-angle pieces of one-inch by four-inch stock, posts may be spaced on eight-foot centers, with two-inch by four-inch intermediate rail.
  - (b) For pipe railings, posts and top and intermediate railings shall be at least one and one-half inches nominal diameter (outside diameter) with posts spaced not more than eight feet on centers.
  - (c) For structural steel railings, posts and top and intermediate rails shall be of two-inch by two-inch by three-eighths-inch angles or other metal shapes of equivalent bending strength with posts spaced not more than eight feet on centers.
  - (d) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least two hundred pounds applied in any direction at any point on the top rail.
  - (e) Other types, sizes, and arrangements of railing construction are acceptable provided they meet the following conditions:
    - (i) A smooth-surfaced top rail at a height above floor, platform, runway, or ramp level of from thirty-six to forty-two inches nominal;
    - (ii) A strength to withstand at least the minimum requirement of two hundred pounds top rail pressure;
    - (iii) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent at least to that afforded by a standard intermediate rail;
    - (iv) Elimination of overhang of rail ends unless such overhang does not constitute a hazard; such as, baluster railings, scrollwork railings, paneled railings.

---

**WAC 296-24-75011 (Cont.)**

- (4) A standard toeboard shall be a minimum of four inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place and with not more than one-quarter-inch clearance above floor level. It may be made of any substantial material either solid or with openings not over one inch in greatest dimension.

Where material is piled to such height that a standard toeboard does not provide protection, paneling from floor to intermediate rail, or to top rail shall be provided.

- (5) A handrail shall consist of a lengthwise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. The handrail shall be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. The ends of the handrail should be turned in to the supporting wall or otherwise arranged so as not to constitute a projection hazard.
- (a) The height of handrails shall be not more than thirty-four inches nor less than thirty inches from upper surface of handrail to surface of tread in line with face of riser or to surface of ramp.
- (b) The size of handrails shall be: When of hardwood, at least two inches in diameter; when of metal pipe, at least one and one-half inches in diameter. The length of brackets shall be such as will give a clearance between handrail and wall or any projection thereon of at least one and one-half inches. The spacing of brackets shall not exceed eight feet.
- (c) The mounting of handrails shall be such that the completed structure is capable of withstanding a load of at least two hundred pounds applied in any direction at any point on the rail.
- (6) All handrails and railings shall be provided with a clearance of not less than one and one-half inches between the handrail or railing and any other object.
- (7) Floor opening covers may be of any material that meets the following strength requirements:
- (a) Trench or conduit covers and their supports, when located in plant roadways, shall be designed to carry a truck rear-axle load of at least twenty thousand pounds.
- (b) Manhole covers and their supports, when located in plant roadways, shall comply with local standard highway requirements if any; otherwise, they shall be designed to carry a truck rear-axle load of at least twenty thousand pounds.
- (c) The construction of floor opening covers may be of any material that meets the strength requirements. Covers projecting not more than one inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not over thirty degrees. All hinges, handles, bolts, or other parts shall set flush with the floor or cover surface.
- (8) Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least two hundred pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than four inches long or of slatwork with openings not more than two inches wide with length unrestricted.
- (9) Wall opening barriers (rails, rollers, picket fences, and half doors) shall be of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least two hundred pounds applied in any direction (except upward) at any point on the top rail or corresponding member.

---

**WAC 296-24-75011 (Cont.)**

- (10) Wall opening grab handles shall be not less than twelve inches in length and shall be so mounted as to give one and one-half inches clearance from the side framing of the wall opening. The size, material, and anchoring of the grab handle shall be such that the completed structure is capable of withstanding a load of at least two hundred pounds applied in any direction at any point of the handle.
- (11) Wall opening screens shall be of such construction and mounting that they are capable of withstanding a load of at least two hundred pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grillwork with openings not more than eight inches long, or of slatwork with openings not more than four inches wide with length unrestricted.

[Statutory Authority: Chapter 49.17 RCW. 91-03-044 (Order 90-18), § 296-24-75011, filed 1/10/91, effective 2/12/91; 89-11-035 (Order 89-03), § 296-24-75011, filed 5/15/89, effective 6/30/89. Statutory Authority: RCW 49.17.040, 49.17.150, and 49.17.240. 79-08-115 (Order 79-9), § 296-24-75011, filed 7/31/79; Order 73-5, § 296-24-75011, filed 5/9/73 and Order 73-4, § 296-24-75011, filed 5/7/73.]

**WAC 296-24-765 Fixed industrial stairs.**

[Order 73-5, § 296-24-765, filed 5/9/73 and Order 73-4, § 296-24-765, filed 5/7/73.]

**WAC 296-24-76501 Terms.** The following terms shall have the meaning ascribed in this section when referred to in WAC 296-24-76503 through 296-24-76523 unless the context requires otherwise.

- (1) **Handrail.** A single bar or pipe supported on brackets from a wall or partition to provide a continuous handhold for persons using a stair.
- (2) **Nose, nosing.** That portion of a tread projecting beyond the face of the riser immediately below.
- (3) **Open riser.** The air space between the treads of stairways without upright members (risers).
- (4) **Platform.** An extended step or landing breaking a continuous run of stairs.
- (5) **Railing.** A vertical barrier erected along exposed sides of stairways and platforms to prevent falls of persons. The top member of railing usually serves as a handrail.
- (6) **Rise.** The vertical distance from the top of a tread to the top of the next higher tread.
- (7) **Riser.** The upright member of a step situated at the back of a lower tread and near the leading edge of the next higher tread.
- (8) **Stairs, stairway.** A series of steps leading from one level or floor to another, or leading to platforms, pits, boiler rooms, crossovers, or around machinery, tanks, and other equipment that are used more or less continuously or routinely by employees, or only occasionally by specific individuals. A series of steps and landings having three or more risers constitutes stairs or stairway.
- (9) **Tread.** The horizontal member of a step.
- (10) **Tread run.** The horizontal distance from the leading edge of a tread to the leading edge of an adjacent tread.
- (11) **Tread width.** The horizontal distance from front to back of tread including nosing when used.

[Order 73-5, § 296-24-76501, filed 5/9/73 and Order 73-4, § 296-24-76501, filed 5/7/73.]



**WAC 296-24-76503 Application of requirements.** This section contains specifications for the safe design and construction of fixed general industrial stairs. This classification includes interior and exterior stairs around machinery, tanks, and other equipment, and stairs leading to or from floors, platforms, or pits. This section does not apply to stairs used for fire exit purposes, to construction operations, to private buildings or residences, or to articulated stairs, such as may be installed on floating roof tanks or on dock facilities, the angle of which changes with the rise and fall of the base support.

When stairs of public and private buildings are located at loading or receiving docks, in maintenance areas, etc., or are used exclusively by employees, the term “fixed industrial steps” will apply and be evaluated accordingly.

[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-76503, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-76503, filed 5/9/73 and Order 73-4, § 296-24-76503, filed 5/7/73.]

**WAC 296-24-76507 Stair strength.** Fixed stairways shall be designed and constructed to carry a load of five times the normal live load anticipated but never of less strength than to carry safely a moving concentrated load of 1,000 pounds.

[Order 73-5, § 296-24-76507, filed 5/9/73 and Order 73-4, § 296-24-76507, filed 5/7/73.]

**WAC 296-24-76509 Stair width.** Fixed stairways shall have a minimum width of 22 inches.

[Order 73-5, § 296-24-76509, filed 5/9/73 and Order 73-4, § 296-24-76509, filed 5/7/73.]

**WAC 296-24-76511 Angle of stairway rise.**

- (1) Fixed stairs shall be installed at angles to the horizontal of between thirty degrees and fifty degrees. Any uniform combination of rise/tread dimensions may be used that will result in a stairway at any angle to the horizontal within the permissible range. Table D-1 gives rise/tread dimensions which will produce a stairway within the permissible range, stating the angle to the horizontal produced by each combination. However, the rise/tread combinations are not limited to those given in Table D-1.
- (2) Because of space limitations a permanent stairway sometimes has to be installed at an angle above the fifty degree critical angle. Such installations are commonly called inclined ladders or ship's ladders, which shall have handrails on both sides and open risers. They shall be capable of sustaining a live load of one hundred pounds per square foot with a safety factor of four. The following preferred and critical angles from the horizontal shall be considered for inclined ladders and ship's ladders:

(a) Thirty-five to sixty degrees - Preferred angle from horizontal.

(b) Sixty to seventy degrees - Critical angle from horizontal.

[Statutory Authority: Chapter 49.17 RCW. 89-11-035 (Order 89-03), § 296-24-76511, filed 5/15/89, effective 6/30/89; Order 73-5, § 296-24-76511, filed 5/9/73 and Order 73-4, § 296-24-76511, filed 5/7/73.]

**WAC 296-24-76513 Stair treads.** Each tread and the top landing of a stairway, where risers are used, should have a nose which extends one-half inch to 1 inch beyond the face of the lower riser. Noses should have an even leading edge. All treads shall be reasonably slip-resistant and the nosings shall be of nonslip finish. Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated or is of definite nonslip design. Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs.

**WAC 296-24-76513 (Cont.)**

**TABLE D-1**

Angle to horizontal	Rise (in inches)	Tread run (in inches)
30°35'	6 1/2	11
32°08'	6 3/4	10 3/4
33°41'	7	10 1/2
35°16'	7 1/4	10 1/4
36°52'	7 1/2	10
38°29'	7 3/4	9 3/4
40°08'	8	9 1/2
41°44'	8 1/4	9 1/4
43°22'	8 1/2	9
45°00'	8 3/4	8 3/4
46°38'	9	8 1/2
48°16'	9 1/4	8 1/4
49°54'	9 1/2	8

[Order 73-5, § 296-24-76513, filed 5/9/73 and Order 73-4, § 296-24-76513, filed 5/7/73.]

**WAC 296-24-76515 Length of stairways.** Long flights of stairs, unbroken by landings or intermediate platforms, should be avoided. Consideration should be given to providing intermediate platforms where practical and where such stairways are in frequent use. Stairway platforms shall be no less than the width of a stairway and a minimum of 30 inches in length measured in the direction of travel.

[Order 73-5, § 296-24-76515, filed 5/9/73 and Order 73-4, § 296-24-76515, filed 5/7/73.]

**WAC 296-24-76519 Vertical clearance.** Vertical clearance above any stair tread to an overhead obstruction shall be at least 7 feet measured from the leading edge of the tread.

[Order 73-5, § 296-24-76519, filed 5/9/73 and Order 73-4, § 296-24-76519, filed 5/7/73.]

**WAC 296-24-76521 Open risers.** Stairs having treads of less than 9-inch width should have open risers.

[Order 73-5, § 296-24-76521, filed 5/9/73 and Order 73-4, § 296-24-76521, filed 5/7/73.]

**WAC 296-24-76523 General.** Open grating type treads are desirable for outside stairs.

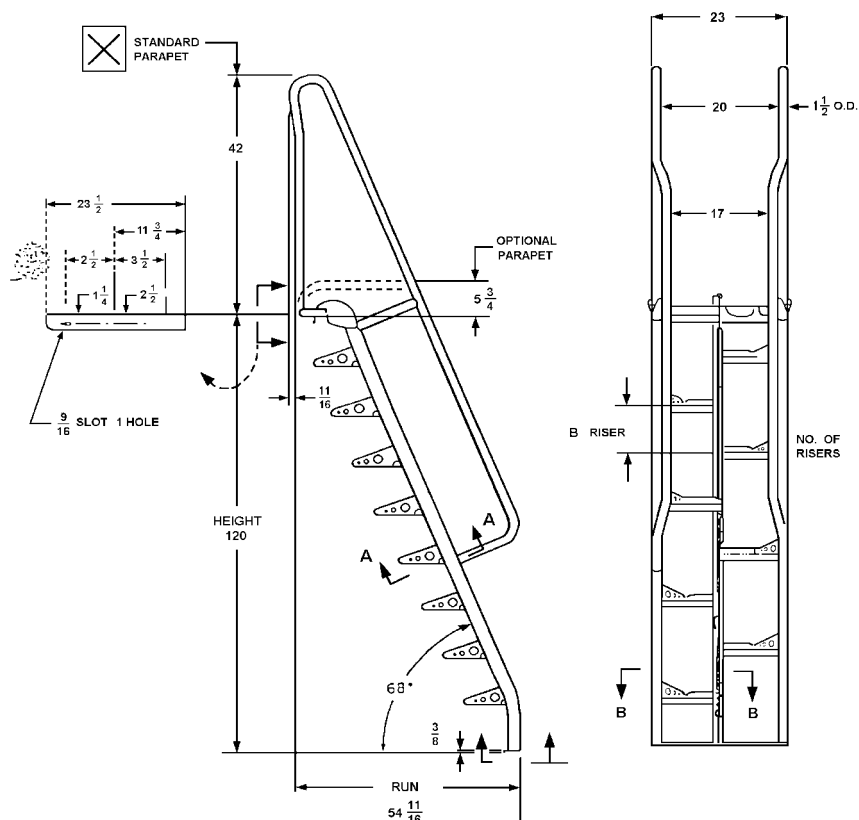
[Order 73-5, § 296-24-76523, filed 5/9/73 and Order 73-4, § 296-24-76523, filed 5/7/73.]

**WAC 296-24-76555 Alternating tread-type stairs.** Alternating tread-type stairs have a series of steps between 50 and 70 degrees from horizontal, attached to a center support rail in an alternating manner so that a user of the stairs never has both feet at the same level at the same time. (See Figure D-12.)

- (1) Alternating tread-type stairs shall be designed, installed, used, and maintained in accordance with approved manufacturer's specifications, and shall have the following:
  - (a) Stair rails on all open sides;
  - (b) Handrails on both sides of enclosed stairs;
  - (c) Stair rails and handrails of such configuration as to provide an adequate handhold for a user grasping it to avoid a fall;

**WAC 296-24-76555 (Cont.)**

- (d) A minimum of 17 inches between handrails;
  - (e) A minimum width of 22 inches overall;
  - (f) A minimum tread depth of 8 inches;
  - (g) A minimum tread width of 7 inches; and
  - (h) A maximum rise of 9 1/2 inches to the tread surface of the next alternating tread.
- (2) Alternating tread-type stairs shall not have more than a 20-foot continuous rise. Where more than a 20-foot rise is necessary to reach the top of a required stair, one or more intermediate platforms shall be provided in accordance with WAC 296-24-76515.
- (3) Stairs and platforms shall be installed so the top landing of the alternating tread stair is flush with the top of the landing platform.
- (4) Stair design and construction shall sustain a load of not less than five times the normal live load, but never less strength than to carry safely a moving concentrated load of 1,000 pounds.



- (5) Treads shall be equipped with slip-resistant surfaces.
- (6) Where a platform or landing is used, the width shall not be less than the width of the stair nor less than 30-inch depth in the direction of travel. Stairs shall be flush with the top of the landing platform.

[Statutory Authority: Chapter 49.17 RCW. 92-17-022 (Order 92-06), § 296-24-76555, filed 8/10/92, effective 9/10/92; 91-03-044 (Order 90-18), § 296-24-76555, filed 1/10/91, effective 2/12/91.]

---

**WAC 296-24-780 Portable wood ladders.** The following terms shall have the meaning ascribed in this section when referred to in WAC 296-24-78003 through 296-24-78009 unless the context requires otherwise.

- (1) **Ladders.** A ladder is an appliance usually consisting of two side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending.
- (2) **Stepladder.** A stepladder is a self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.
- (3) **Single ladder.** A single ladder is a nonself-supporting portable ladder, nonadjustable in length, consisting of but one section. Its size is designated by the overall length of the side rail.
- (4) **Extension ladder.** An extension ladder is a nonself-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.
- (5) **Sectional ladder.** A sectional ladder is a nonself-supporting portable ladder, nonadjustable in length consisting of two or more sections of ladder so constructed that the sections may be combined to function as a single ladder. Its size is designated by the overall length of the assembled sections.
- (6) **Trestle ladder.** A trestle ladder is a self-supporting portable ladder, nonadjustable in length, consisting of two sections hinged at the top to form equal angles with the base. The size is designated by the length of the side rails measured along the front edge.
- (7) **Extension trestle ladder.** An extension trestle ladder is a self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable single ladder, with suitable means for locking the ladders together. The size is designated by the length of the trestle ladder base.
- (8) **Special-purpose ladder.** A special-purpose ladder is a portable ladder which represents either a modification or a combination of design or construction features in one of the general-purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses.
- (9) **Trolley ladder.** A trolley ladder is a semifixed ladder, nonadjustable in length, supported by attachments to an overhead track, the plane of the ladder being at right angles to the plane of motion.
- (10) **Side-rolling ladder.** A side-rolling ladder is a semifixed ladder, nonadjustable in length, supported by attachments to a guide rail, which is generally fastened to shelving, the plane of the ladder being also its plane of motion.
- (11) **Wood characteristics.** Wood characteristics are distinguishing features which by their extent and number determine the quality of a piece of wood.
- (12) **Wood irregularities.** Wood irregularities are natural characteristics in or on wood that may lower its durability, strength, or utility.
- (13) **Cross grain.** Cross grain (slope of grain) is a deviation of the fiber direction from a line parallel to the sides of the piece.
- (14) **Knot.** A knot is a branch or limb, imbedded in the tree and cut through in the process of lumber manufacture, classified according to size, quality, and occurrence. The size of the knot is determined as the average diameter on the surface of the piece.

---

**WAC 296-24-780 (Cont.)**

- (15) **Pitch and bark pockets.** A pitch pocket is an opening extending parallel to the annual growth rings containing, or that has contained, pitch, either solid or liquid. A bark pocket is an opening between annual growth rings that contains bark.
- (16) **Shake.** A shake is a separation along the grain, most of which occurs between the rings of annual growth.
- (17) **Check.** A check is a lengthwise separation of the wood, most of which occurs across the rings of annual growth.
- (18) **Wane.** Wane is bark, or the lack of wood from any cause, on the corner of a piece.
- (19) **Decay.** Decay is disintegration of wood substance due to action of wood-destroying fungi. It is also known as dote and rot.
- (20) **Compression failure.** A compression failure is a deformation (buckling) of the fibers due to excessive compression along the grain.
- (21) **Compression wood.** Compression wood is an aberrant (abnormal) and highly variable type of wood structure occurring in softwood species. The wood commonly has density somewhat higher than does normal wood, but somewhat lower stiffness and tensile strength for its weight in addition to high longitudinal shrinkage.
- (22) **Low density.** Low-density wood is that which is exceptionally light in weight and usually deficient in strength properties for the species.

[Order 73-5, § 296-24-780, filed 5/9/73 and Order 73-4, § 296-24-780, filed 5/7/73.]

**WAC 296-24-78003 Application of requirements.** This section is intended to prescribe rules and establish minimum requirements for the construction of the common types of portable wood ladders, in order to insure safety under normal conditions of usage. Other types of special ladders, fruit-picker's ladders, industrial tripod ladders, combination step and extension ladders, stockroom step ladders, aisle-way step ladders, shelf ladders, and library ladders are not specifically covered by this section.

[Order 73-5, § 296-24-78003, filed 5/9/73 and Order 73-4, § 296-24-78003, filed 5/7/73.]

**WAC 296-24-78005 Materials.**

- (1) Requirements applicable to all wood parts.
  - (a) All wood parts shall be of the species specified in Table D-5, seasoned to a moisture content of not more than 15 percent; smoothly machined and dressed on all sides; free from sharp edges and splinters; sound and free by accepted visual inspection from shake, wane, compression failures, decay, or other irregularities except as hereinafter provided. Low-density wood shall not be used.
  - (b) Black streaks in western hemlock shall not be considered an irregularity, except that chambers associated with black streaks when present in the part, shall be limited as specified for pitch and bark pockets.
- (2) Permissible irregularities in side rails and back rails.

---

**WAC 296-24-78005 (Cont.)**

- (a) The general slope of grain in side rails of minimum dimension shall not be steeper than 1 in 12, except that for ladders under 10 feet in length and having flat steps for treads, the general slope of grain shall not be steeper than 1 in 10. The slope of grain in areas of local grain deviation shall not be steeper than 1 in 12 or 1 in 10 as specified above when occurring on the edges or in the outer one-fourth of the width of the wide face. Local areas of grain deviation within the center half of the width of the wide face may contain grain slope as steep as 1 in 8. Local deviations of grain associated with otherwise permissible irregularities are permitted.
  - (b) Knots shall not appear in narrow faces of side rails. Knots, if tight and sound and less than one-half inch in diameter, are permitted on the wide face provided they are at least one-half inch back from either edge and not more frequent than 1 to any 3 feet of ladder length.
  - (c) Pitch and bark pockets are permitted provided they are not more than one-eighth inch in width, or more than 2 inches in length, or more than one-half inch in depth, and then only if they are not more frequent than 1 to any 3 feet of ladder length.
  - (d) Checks are permitted on side rails provided they are not more than 6 inches in length or more than one-half inch in depth.
  - (e) Occurrences of compression wood in relatively small amounts and positively identified by competent and conscientious visual inspection of side rails are permitted provided no single streak shall exceed one-half inch in width nor shall the aggregate of streaks exceed one-fourth of the face of the side rail. Borderline forms of compression wood not positively identified by competent and conscientious visual inspection are permitted. Ladder parts containing bow or crook which would interfere with the operation of the ladder shall not be used.
- (3) Permissible irregularities in flat steps, rungs, and cleats.
- (a) The general slope of grain in flat steps of minimum dimension shall not be steeper than 1 in 12, except that for ladders under 10 feet in length the slope of grain shall not be steeper than 1 in 10.
- The slope of grain in areas of local deviation shall not be steeper than 1 in 12 or 1 in 10 as specified above. For all ladders, cross grain not steeper than 1 in 10 are permitted in lieu of 1 in 12, provided the size is increased to afford at least 15 percent greater calculated strength than for ladders built to minimum dimensions. Local deviations of grain associated with otherwise permissible irregularities are permitted.
- (b) The general slope of grain and that in areas of local deviations of grain shall not be steeper than 1 in 15 in rungs and cleats. For all ladders cross grain not steeper than 1 in 12 are permitted in lieu of 1 in 15, provided the size is increased to afford at least 15 percent greater calculated strength for ladders built to minimum dimensions. Local deviations of grain associated with otherwise permissible irregularities are permitted.
  - (c) Knots over one-eighth inch in diameter shall not appear in rungs. Knots shall not appear in the narrow faces of flat steps and cleats. Knots appearing in the wide faces of flat steps and cleats shall not exceed a diameter of one-fourth inch.
- (4) Classification of species of wood. Table D-5 gives a list of native woods, divided into four groups on the basis of mechanical properties considered from the standpoint of use for ladder construction.

**WAC 296-24-78005 (Cont.)**

- (a) All minimum dimensions and specifications set forth in (b)(ii) for side rails and flat steps are based on the species of wood listed in Group 3 in Table D-5 except where otherwise provided. The species of all other groups may be substituted for those of Group 3 when used in sizes that provide at least equivalent strength. (See Table D-5 for suggested methods of size adjustment.)
- (b) All minimum dimensions and specifications set forth in the following "factor for increase in" for rungs and cleats are based on the species of wood listed in Group 1 in Table D-5. The cross-sectional dimensions specified for Group 1 species are increased by the factors shown in this subsection (based on the percentages of Table D-5) for the species group of which the cleats are to be made.

**FACTOR FOR INCREASE IN**

Species group	Each dimension	Width only (thickness unchanged)
1	1.00	1.00
2	1.03	1.05
3	1.11	1.19
4	1.17	1.26

**TABLE D-5**

**CLASSIFICATION OF VARIOUS SPECIES OF WOOD ACCEPTABLE FOR USE IN LADDER**

The species are listed alphabetically within each group. The position of any species within a group therefore bears no relation to its strength or acceptability.

Where ladders are desired for use under conditions favorable to decay, it is recommended that the heartwood of decay-resistant species be used, or that the wood be given a treatment with a wood preservative. The species having the most durable heartwood are marked with an asterisk (\*), and these should be preferred where resistance to decay is required.

**GROUP 1**

The allowable fiber stress in bending for the species listed herein when used for side rails shall not exceed two thousand one hundred fifty pounds per square inch. These species may be substituted for Group 3 woods on the following basis: The dimensions may be not more than ten percent smaller for each cross-section dimension, or the thickness may remain unchanged, in which case the width may not be more than fifteen percent smaller if used edgewise (as in a rail) or twenty-five percent smaller if used flatwise (as in a tread).

White ash	Fraxinus americana, pennsylvanica, quadrangulata
Beech	Fagus grandifolia
Birch	Betula lenta, alleghaniensis, nigra (2)
Rock elm	Ulmus thomasii
Hickory	Carya ovata, laciniosa, tomentosa, glabra
Locust*	Robinia pseudoacacia, Gleditsia triacanthos
Hard maple	Acer nigrum, saccharum
Red maple	Acer rubrum (3)
Red oak	Quercus velutina, marilandica, kelloggii, falcata var. pagodaefolia, laurifolia, ellipsoidalis, rubra, nuttallii, palustris, coccinea, shumardii, falcata, laevis, phellos
White oak	Quercus arizonica, douglasii, macrocarpa, lobata, prinus, muehlenbergii, emoryi, gambelii, oblongifolia, virginiana, garryana, lyrata, stellata, michauxii, bicolor, alba
Pecan	Carya illinoensis, cordiformis, myristicaeformis (4), aquatica (4)
Persimmon	Diospyros virginiana

---

**WAC 296-24-78005 (Cont.)**

**GROUP 2**

The allowable fiber stress in bending for the species listed herein when used for side rails shall not exceed two thousand pounds per square inch. These species may be substituted for Group 3 woods on the following basis: The dimensions may be not more than seven and one-half percent smaller for each cross-section dimension, or the thickness may remain unchanged, in which case the width may be not more than eleven percent smaller if used edgewise (as in a rail) or twenty percent smaller if used flatwise (as in a tread).

Douglas fir (coast region)	Pseudotsuga menziesii
Western larch	Larix occidentalis
Southern yellow pine	Pinus taeda, palustris, echinata, elliotii, rigida, virginiana

**GROUP 3**

The allowable fiber stress in bending for the species listed herein when used for side rails shall not exceed one thousand six hundred pounds per square inch.

Red alder	Alnus rubra, rhombifolia (2)
Oregon ash	Fraxinus latifolia
Pumpkin ash	Fraxinus profunda
Alaska cedar*	Chamaecyparis nootkatensis
Port Orford cedar*	Chamaecyparis lawsoniana
Cucumber	Magnolia acuminata
Cypress*	Taxodium distichum
Soft elm	Ulmus americana, rubra
Douglas fir (Rocky Mountain type)	Pseudotsuga menziesii var. glauca
Noble fir	Abies procera
Gum	Liquidambar styraciflua
West coast hemlock	Tsuga heterophylla
Magnolia	Magnolia grandiflora
Oregon maple	Acer macrophyllum
Norway pine	Pinus resinosa
Poplar	Liriodendron tulipifera
Redwood*	Sequoia sempervirens
Eastern spruce	Picea glauca, rubens
Sitka spruce	Picea sitchensis
Sycamore	Platanus occidentalis
Tamarack	Larix laricina
Tupelo	Nyssa aquatica, sylvatica

**GROUP 4**

The allowable fiber stress in bending for the species listed herein when used for side rails shall not exceed one thousand three hundred seventy-five pounds per square inch. These species may be substituted for Group 3 woods on the following basis: The dimensions shall be at least five percent greater for each cross-section dimension, or the thickness may remain unchanged, in which case the width shall be at least seven and one-half percent greater if used edgewise (as in a rail) or fifteen percent greater if used flatwise (as in a tread).

Aspen	Populus tremuloides, grandidentata
Basswood	Tilia americana, heterophylla (2)
Buckeye	Aesculus octandra, glabra (2)



---

**WAC 296-24-78005 (Cont.)**

Butternut	Juglanscinerea
Incense cedar*	Libocedrus decurrens
Western red cedar*	Thuja plicata
Cottonwood	Populus balsamifera, deltoides, sargentii, heterophylla
White fir	Abies concolor, grandis, amabilis, lasiocarpa, magnifica
Hackberry	Celtis occidentalis, laevigata (2)
Eastern hemlock	Tsuga canadensis
Holly	Ilex opaca
Soft maple	Acer saccharinum
Lodgepole pine	Pinus contorta
Idaho white pine	Pinus monticola
Northern white pine	Pinus strobus
Ponderosa pine	Pinus ponderosa, pinus jeffreyi (Jeffrey pine)
Sugar pine	Pinus lambertiana
Engelmann spruce	Picea engelmannii

*Note 1: The common and scientific names of species used conform to the American Lumber Standards nomenclature and in most cases to U.S. Department of Agriculture Handbook No. 41, "Check List of Native and Naturalized Trees of the United States (including Alaska)," by Elbert L. Little. These publications can be obtained from the U.S. Government Printing Office, North Capital and "H" Streets Northwest, Washington D.C. 20401*

*Note 2: This species is commonly associated with others of the same genus under American Lumber Standards nomenclature, but no strength tests have been made on it at the Forest Products Laboratory.*

*Note 3: Included under soft maple in American Lumber Standards nomenclature.*

*Note 4: This species is not included under this common name in American Lumber Standards nomenclature, but strength data are available and it is accordingly included in this classification.*

- (5) Metal parts. All metal parts shall be made of aluminum, steel, wrought iron, malleable iron, or other material, adequate in strength for the purpose intended, and shall be properly coated and protected so as to be rust resistant.

[Order 73-5, § 296-24-78005, filed 5/9/73 and Order 73-4, § 296-24-78005, filed 5/7/73.]

**WAC 296-24-78007 Construction requirements.**

- (1) Basis of requirements.
- (a) Dimensions specified hereinafter for wood ladders are the minimum dressed cross-sectional dimensions for the types of ladders herein designated, based on the species of woods specified in WAC 296-24-78005(4), at a moisture content of 15 percent. The dimensions for side rails are based on a mortise or gain as specified for the various types of ladders for step or rung attachments. Where the strength of the side rails or back legs is reduced by a greater mortise or gain than shown, or where it is desired to use a cross section for any wood part either dimension of which is less than that specified, the required dimensions may be found as indicated in (1)(b) of this section.

**WAC 296-24-78007 (Cont.)**

- (b) For the side rails of single extension and sectional ladders, the proposed section shall develop an actual stress per square inch not greater than 2,150 pounds for Group 1 woods, 2,000 pounds for Group 2 woods, 1,600 pounds for Group 3 woods, or 1,375 pounds for Group 4 woods when computed by the following formula applying to rectangular sections, with a maximum tolerance of 5 percent over these stresses:

$$S = \frac{3LD (P+W/16)}{2B (D^3-d^3)} \quad \frac{1.5 LD (25+W/16)}{B (D^3-0.67)}$$

P = 25 pounds, which is the normal component on each rail of a load of 200 pounds at the center of the ladder, equally distributed between the rails, when the foot of the ladder is moved out of the perpendicular by one-quarter of its length.

S = Stress in extreme fiber in pounds per square inch.

W = Weight of ladder in pounds.

L = Maximum working length of ladder in inches.

B = Net thickness of each side rail in inches.

D = Depth of side rail in inches.

d = Diameter of hole board for rung ( $d^3$  shall be taken as not less than 0.67).

- (c) Adjustment of sizes for wood parts of stepladders and other ladder types covered by this section may be made as follows:
- (i) The dimensions specified in later sections for parts having rectangular cross sections generally represent only one of a number of possible combinations of thickness and width which could satisfy the requirements for strength and stiffness. Depending upon the material sizes available, manufacturing practices, and like factors, parts produced by a particular manufacturer may or may not agree exactly with the sizes given later. The following provisions provide means for determining equality of load-carrying capacity of parts of different sizes or of determining sizes needed to provide equality.
- (ii) Any changes in dimensions shall result in a change in the width-thickness ratio for side rails of back legs not greater than 25 percent from the ratio for a corresponding ladder as now covered in this section.
- (iii) Where both dimensions are different from those specified, the load-carrying capacity in bending of a part will be equal to or greater than that of a part of specified dimensions if the ratio  $P_2/P_1$  is not less than 1, where

$$\frac{P_2}{P_1} = \frac{B_2 D_2^2}{B_1 D_1^2}$$

and

- B = Dimension of the part at right angles to the direction of load (width of a step, thickness of a side rail or back leg).
- D = Dimension of the part parallel to the direction of load (thickness of a step, width of a side rail or back leg).
- $B_1 D_1$  = Dimensions as specified.
- $B_2 D_2$  = Dimensions of part being considered.

**WAC 296-24-78007 (Cont.)**

- (iv) The dimensions to be used in the computations are net dimensions. For example, in the case of a stepladder side rail, the dimension B is to be taken as the gross thickness of the rail minus the depth of the gain for the steps. Where there is a rung hole at the center of depth of a rail, a somewhat more accurate comparison may be made by the use of the formula

$$\frac{P_2}{P_1} = \frac{B_2 D_1 (D_2^3 - d^3)}{B_1 D_2 (D_1^3 - d^3)}$$

Where the symbols have the same meanings as before and d is the diameter of the hole for the rung tenon. In most instances the difference in results calculated by this and by the earlier formula will be slight.

- (2) Portable stepladders. Stepladders longer than 20 feet shall not be supplied. Stepladders as hereinafter specified shall be of three types:

Type I--Industrial stepladder, 3 to 20 feet for heavy duty, such as utilities, contractors, and industrial use.

Type II--Commercial stepladder, 3 to 12 feet for medium duty, such as painters, offices, and light industrial use.

Type III--Household stepladder, 3 to 6 feet for light duty, such as light household use.

- (a) General requirements.

- (i) Slope is the inclination of side rails or back legs with respect to the vertical and is expressed as a deviation from the vertical per unit length of the member. Stepladders shall be so constructed, that when in the open position, the slope of the front section shall not be less than 3 1/2 inches and the slope of the back section not less than 2 inches, for each 12-inch length of side rail.
- (ii) A uniform step spacing shall be employed which shall be not more than 12 inches. Steps shall be parallel and level when the ladder is in position for use.
- (iii) The minimum width between side rails at the top, inside to inside, shall be not less than 11 1/2 inches. From top to bottom, the side rails shall spread at least 1 inch for each foot of length of stepladder.
- (iv) When minimum thickness of side rails is used, steps shall be closely fitted into the grooves in the side rails one-eighth inch in depth with a tolerance of one thirty-second inch, and shall be firmly secured as hereinafter described; or they shall be closely fitted into metal brackets of an equivalent strength, which in turn shall be firmly secured to the side rails. The depth of groove herein provided may be increased in proportion to the thickness of side rails as provided in WAC 296-24-78007 (2)(b),(c) and (d).
- (v) All stepladders shall have a top with wood or metal brackets or fittings tightly secured to the top, side rails, and back legs, to allow free swinging of the back section without excessive play or wear at the joints.

---

**WAC 296-24-78007 (Cont.)**

- (vi) A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in open positions shall be a component of each stepladder. The spreader shall have all sharp points covered or removed to protect the user. For Type III ladder, the pail shelf and spreader may be combined in one unit (the so-called shelf-lock ladder).
  - (vii) When measured along the front edge of the side rails, all stepladders shall measure within 3 inches of the specified length.
  - (viii) Where bucket shelves are provided, they shall be constructed to support a load of 25 pounds and shall be so fastened that they can be folded up when the ladder is closed.
  - (ix) All metal parts and fittings shall be securely attached by means of rivets, bolts, screws, or equivalent fasteners.
- (b) Type I industrial stepladder.
- (i) The minimum dimensions of the parts of the Type I stepladder shall be as shown in Table D-2 when made of Group 2 or Group 3 woods.
    - (A) The minimum thickness of side rails provides for the cutting of a groove of one-eighth inch in depth with the tolerance indicated in WAC 296-24-78007 (2)(a)(iv), and shall be increased when grooves of greater depth are used.
  - (ii) Steps shall be secured with at least two 6-d nails at each end, or the equivalent thereof. Each step shall be reinforced by a steel rod not less than 3/16 inch in diameter with standard commercial tolerances, which shall pass through metal washers of sufficient thickness and diameter on each end to prevent pressing--into the side rails, and a truss block which shall be fitted between the rod and the center of each step, or by a metal angle brace on each end firmly secured to the steps and side rails, or by construction of equivalent strength and safety. Where the rod reinforcement construction is used, the bottom step shall be provided further with a metal angle brace on each end which shall be securely attached to the bottom step and side rails. In addition, all steps 3 5/8 inches wide and 27 inches or more in overall length and all steps 4 1/4 inches wide and 32 inches or more in overall length shall be provided with a metal angle brace at each end securely attached to the step and side rail.
  - (iii) The back section shall be braced by one of the following methods:
    - (A) The back legs shall be braced with 1 1/8-inch diameter rungs of Group 1 woods (see Table D-5), or material of equivalent strength, having 7/8-inch diameter tenons or oval wood rungs, or rectangular wood rungs of equivalent strength, spaced not more than 12 inches apart. The back legs shall be bored with holes either extending through the legs or to within three-sixteenths inch of the outside face of the legs, the size of the hole to be such as to insure a tight fit for the rung. The shoulder of the rung shall be forced firmly against the leg, and the tenon secured in place with a nail, or the equivalent thereof, to prevent turning of the rungs. The back legs shall be braced by a metal angle brace on each side, securely fastened to the rung and the back legs, one rung to be braced for each 4 feet of length or fraction thereof, on ladders 4 feet or more in length, with braces required only on the bottom rung for ladders that are 4 feet or shorter. Where

---

**WAC 296-24-78007 (Cont.)**

rungs are more than 28 inches in length between the back legs they shall be provided with center bearing consisting of a wood bar not less than 3/4 by 2 inches in a cross-section securely nailed to each rung passing through it and long enough to include each rung longer than 28 inches.

- (B) The back leg shall be braced with horizontal wood bars of Group 1, 2, or 3 woods in Table D-5 and not less than 3/4 by 2 1/2 inches in cross-section, spaced not more than 12 inches apart. The ends of the bars shall fit into metal sockets of not less than 20-gauge (manufacturers standard) steel, or other material of equivalent strength, or into mortises of not less than one-eighth inch (tolerance of  $\pm$  one-thirty-second inch) in depth in the back legs. A steel rod not less than 3/16 inch in diameter with standard commercial tolerance shall pass through the back legs, the bar, and at each end through metal washers of sufficient diameter and thickness to prevent passing into the back legs. The back legs shall also be braced by a metal angle brace on each side, securely fastened to the bar and to the legs, one bar to be so braced for at least each 4 feet of length or fraction thereof, with braces required only on bottom bar for ladders that are 4 feet or shorter. Metal sockets when used shall be attached to the back legs by rivets or by means of a rod running through the socket or equivalent thereof.
- (iv) The back legs shall be reinforced by a rivet through the depth of the leg above the hinge point, by metal plates or collars at the hinge point, or by other means suitable for preventing splitting of the back leg from the hinge pin to the top.
- (c) Type II commercial stepladder.
  - (i) The minimum dimensions of the parts of the Type II stepladder shall be as given in Table D-3 when made of Group 2 or Group 3 woods.
    - (A) The minimum thickness of side rails provides for the cutting of a groove of one-eighth inch in depth with the tolerance indicated in (2)(a)(iv), and shall be increased when grooves of greater depth are used.
  - (ii) Steps shall be secured with at least two 6-d nails at each end, or the equivalent thereof. Each step shall be reinforced by a steel rod not less than 3/16 inch in diameter with standard commercial tolerances which shall pass through metal washers of sufficient thickness and diameter on each end to prevent pressing into the side rails, and a truss block shall be fitted between the truss rod and center of each step; or by a metal angle brace on each end firmly secured to the steps and side rails; or by construction of equivalent strength and safety. Where the rod reinforcement construction is used, the bottom step shall be provided further with a metal angle brace on each end which shall be securely attached to the bottom step and side rails. In addition all steps 27 inches or more in overall length shall be provided with a metal angle brace at each end securely attached to the step and side rails.
  - (iii) The back legs shall be braced by one of the three following methods:
    - (A) With 7/8-inch diameter wood dowels of Group 1 woods (see Table D-5) or material of equivalent strength having not less than 5/8-inch tenons firmly secured in the back legs and spaced not more than 12 inches apart. The back

**WAC 296-24-78007 (Cont.)**

legs shall be bored with holes either extending through the legs or to within three-sixteenths inch of the outside face of the legs, the size of the hole to be such as to insure a tight fit for the dowel. The shoulder of the dowel shall be forced firmly against the leg and the tenon secured in place with a nail, or the equivalent thereof, to prevent turning of the dowel.

- (aa) A bar connecting two or more of the dowels shall be provided on all ladders of 6 feet or more. The cross-sectional dimensions of the bar shall be the same as the cross-sectional dimensions of the back legs, and the dowels shall pass through holes at the centerline of the bar. The bar shall be attached at the center of the length of the lower two dowels on a 6-foot ladder and shall extend upward one dowel for each 2 feet of added length.
- (B) With wood dowels as set forth in (2)(c)(iii)(A) of this section, plus an inverted V bracing of 3/4-inch by 1 1/2-inch material through which the dowels extend, the length of the V to extend two-thirds of the way up the back.
- (C) With horizontal bracing of Group 1, 2, 3, or 4 woods (see Table D-5) not less than 3/4 by 2 inches in cross-section, the ends of which shall fit into metal sockets of not less than 20-gauge (manufacturing standard), steel, or other material of equivalent strength or into mortises not less than one-eighth inch in depth in back legs. The bars shall be reinforced by steel rods not less than 3/16 inch in diameter with standard commercial tolerances which shall pass through the back legs, the bar, and, at each end, through metal washers of sufficient diameter and thickness to prevent pressing into the back legs. The spacing of such braces shall not exceed 3 feet, and there shall be one brace on 3- and 4-foot ladders, two braces on 5- and 6-foot ladders, three braces on 7- and 8-foot ladders, and four braces on 10- and 12-foot ladders. The bottom bar shall not be more than 18 inches from the bottom of the ladder, and, where only one bar is used, it shall be braced by a metal angle brace on each end securely attached to the bar and the back leg.
- (d) Type III household stepladder.
  - (i) The minimum dimensions of the parts of the Type III stepladder shall be as follows when made of Group 2 or Group 3 woods.

	Length, 3 to 6 feet	
	Thickness (Inch)	Depth (Inches)
Side rails	3/4	2 1/2
Back legs	3/4	1 5/16
Steps	3/4	3
Top	3/4	5

*The minimum thicknesses of side rails provide for the cutting of a groove one-eighth inch in depth with the tolerance indicated in WAC 296-24-78007 (2)(a)(iv), and shall be increased when grooves of greater depth are used.*

**WAC 296-24-78007 (Cont.)**

- (ii) Steps shall be secured with at least one 6-d!ht nail at each end, or the equivalent thereof. Each step shall be reinforced by a steel rod not less than 3/16 inch in diameter with standard commercial tolerance which shall pass through metal washers of sufficient thickness and diameter to prevent pressing into the side rails, or by a metal brace at each end firmly secured to steps and side rails or by construction of equivalent strength and safety. Where the rod reinforcement construction is used, the bottom step shall be provided further with a metal angle brace on each end which shall be securely attached to the bottom step and side rail.
- (iii) Back legs shall be braced by one of the two following methods or by construction of equivalent strength and safety:
  - (A) By diagonal slates of groups 1, 2, 3, or 4 wood (see Table D-5) not less than 5/16 by 1 1/4 inches securely fastened to the back legs by nails, screws, or the equivalent thereof.
  - (B) With horizontal bracing of Groups 1, 2, 3, or 4 wood (see Table D-5) not less than 5/8 by 1 5/8 inches in cross section, the ends of which shall fit into metal sockets of not less than 20-gauge (manufacturing standard) steel or other material of equivalent strength or into mortises not less than one-eighth inch in depth in back legs. The bars shall be reinforced by steel rods not less than 3/16 inch in diameter with standard commercial tolerances which shall pass through the back leg, the bar, and at each end through metal washers of sufficient diameter and thickness to prevent pressing into each leg. The spacing of such bars shall not exceed 3 feet, and there shall be one brace on 3- and 4-foot ladders, two braces on 5- and 6-foot ladders. The bottom bar shall be not more than 18 inches from the bottom of the ladder.
- (3) Portable rung ladders. Portable rung ladders as herein specified shall be of four types, as follows: Single ladder; two-section extension ladder; section ladder; trestle and extension trestle ladder.
  - (a) General requirements.
    - (i) The base or lower portion of a ladder may have either parallel sides or flared sides in accordance with commercial practice.
    - (ii) Rungs shall be parallel, level, and uniformly spaced. The spacing shall be not more than 12 inches, except as hereinafter specified.

**TABLE D-2  
DIMENSIONS FOR TYPE I STEP LADDERS**

Length, 12 feet and less			Length, 14 and 16 feet		Length, 18 and 20 feet	
	Thickness (inch)	Depth (inches)	Thickness (inch)	Depth (inches)	Thickness (inch)	Depth (inches)
Side rails	3/4	3 1/4	3/4	3 1/2	1 1/16	3 1/2
Back legs	3/4	2 1/4	3/4	2 5/8	1 1/16	2 1/4
Steps	3/4	3 5/8	3/4	4 1/4	3/4	4 1/4
Tops	3/4	5 1/2	3/4	5 1/2	3/4	5 1/2

**WAC 296-24-78007 (Cont.)**

**TABLE D-3  
DIMENSIONS FOR TYPE II STEP LADDERS**

Length, 3 feet to 8 feet			Length, 10 feet		Length, 12 feet	
	Thickness (inch)	Depth (inches)	Thickness (inch)	Depth (inches)	Thickness (inch)	Depth (inches)
Side rails	3/4	2 5/8	3/4	2 5/8	3/4	3
Back legs	3/4	1 5/8	3/4	1 3/4	3/4	2
Steps	3/4	3 1/2	3/4	3 1/2	3/4	3 5/8
Tops	3/4	5	3/4	5	3/4	5

- (iii) All holes for wood rungs shall either extend through the side rails or be bored so as to give at least a thirteen-sixteenths-inch length of bearing to the rung tenon. In throughbored construction, the rungs shall extend at least flush with the outside rail surface. All holes shall be located on the center line of the wide face of the side rails and shall be of such size as to insure a tight fit for the rung. The shoulder of the rung shall be forced firmly against the side rails and the tenon secured in place with a nail or the equivalent thereof, for the sole purpose of preventing the turning of the rung and maintaining the rung position in the side rail. Ladders used with ladder jacks shall be a 3/16 inch metal tie rod immediately under each rung.
- (iv) Round rungs shall be of Group 1 woods (see Table D-5), shall be not less than 1 1/8 inches in diameter for lengths over 36 inches between side rails and 1 1/4 inches in diameter for lengths over 36 up to and including 72 inches, and shall have not less than seven-eighths-inch-diameter tenons, or rungs of equivalent strength and bearing shall be provided. When rungs are 28 inches or more in length between side rails, they shall, in addition, be provided with center bearing.
- (v) Oval rungs or rungs of any other cross section may be used provided they are secured by a nail at each end or the equivalent thereof, and have at least the same strength and bearing as round rungs of the same length.
- (vi) All metal parts and fittings shall be securely attached by means of rivets, bolts, screws, or equivalent fasteners.
- (vii) The construction and assembly of the movable parts shall be such that they shall operate freely and securely without binding or unnecessary play.
- (viii) When measured along the side rails, no rung ladder or section thereof shall be more than 4 inches shorter than the specified length.
- (ix) Nonslip bases shall be securely bolted, riveted, or attached by equivalent construction to the side rails.
- (x) Hooks shall be securely bolted or riveted to the side rails or equivalent construction and shall be of such dimensions as to withstand the loads imposed upon them.



---

**WAC 296-24-78007 (Cont.)**

- (b) Single ladder.
- (i) Single ladders longer than 30 feet shall not be supplied.
- (ii) The minimum dimensions of the side rails of the single ladder shall be as follows when made of Group 2 or Group 3 woods:

Length of ladder (feet)	Thickness (inches)	Depth (inches)
Up to and including 16	1 1/8	2 1/2
Over 16 up to and including 22	1 1/4	2 3/4
Over 22 up to and including 30	1 1/4	3

- (iii) Smaller side rails will be acceptable in all ladders of this type when reinforced by a steel wire, rod, or strap running the length of the side rails and adequately secured thereto. Where such reinforcement is used, the reinforced rails shall be equivalent in strength to the side rails specified in this WAC 296-24-78007 (3)(b)(ii).
- (iv) The width between the side rails at the base, inside to inside, shall be at least 11 1/2 inches for all ladders up to and including 10 feet. Such minimum widths shall be increased at least one-fourth inch for each additional 2 feet of length.
- (c) Two-section ladder.
- (i) Two-section extension ladders longer than 60 feet shall not be supplied. All ladders of this type shall consist of two sections, one to fit within the side rails of the other, and arranged in such a manner that the upper section can be raised and lowered.
- (ii) The minimum dimensions of the side rails of the two-section extension ladder shall be not less than specified in Table D-4.
- (iii) The minimum dimensions of side rails set forth in Table D-4 are based on the maximum working length, which is the size of ladder less the minimum overlap, which shall be as follows:

Size of ladder (feet)	Overlap (feet)
Up to and including 36	3
Over 36 up to and including 48	4
Over 48 up to and including 60	5

- (iv) Smaller side rails will be acceptable in all ladders of this type when reinforced by a steel wire, rod, or strap running the length of the side rails and adequately secured thereto. Where such reinforcement is used, the reinforced rails shall be equivalent in strength to the side rails specified in Table D-4.
- (v) The minimum distance between side rails of the bottom section, inside to inside, shall be 14 1/2 inches on ladders up to and including 28 feet; 16 inches on all ladders over 28 feet up to and including 40 feet; 18 inches on all ladders over 40 feet.

---

**WAC 296-24-78007 (Cont.)**

- (vi) Rungs. Rungs shall be of white oak, ash, hickory, or wood of equivalent strength not less than 1 1/8 inches in diameter with at least a 7/8 inch diameter tenon. Where the distance between side rails is more than 28 inches rungs shall be supported in the center. Holes for wood rungs shall either extend through the side rails or be bored to give at least a 13/16 inch length of bearing to the rung tenon. In throughbored construction the rungs shall extend at least flush with the outside rail surface. Holes shall be located on the center line of the wide face of the side rails and shall be of such size as to be a tight fit for the rung. The shoulder of the rung shall be forced firmly against the side rails and the tenon secured in place with a nail, or the equivalent thereof, to prevent turning. A 3/16 inch diameter tie rod shall be placed under each rung.
- (vii) All locks and guide irons shall be of metal and shall be of such construction and strength as to develop the full strength of the side rails. All locks shall be positive in their action. The guide irons shall be securely attached and so placed as to prevent the upper section from tipping or falling out while raising, lowering, or in use.
- (viii) Ladders of this type may be equipped with a rope and pulley, which shall be securely attached to the ladder in such manner as not to weaken either the rungs or the side rails. The pulley shall be not less than 1 1/4 inches in diameter.
  - (A) The rope used with the pulley shall be not less than five-sixteenths inch in diameter having a minimum breaking strength of 560 pounds, and shall be sufficient length for the purpose intended.
- (d) Sectional ladder.
  - (i) Assembled combinations of sectional ladders longer than lengths specified in (3)(d)(ii) shall not be used.
  - (ii) The minimum dimensions of side rails shall be as follows for Group 2 or Group 3 woods:

Assembled length of ladder (feet)	Thickness (inches)	Depth (inches)
Up to and including 21	1 1/8	2 3/4
Over 21 up to and including 31	1 1/8	3 1/8

WAC 296-24-78007 (Cont.)

**TABLE D-4**  
**DIMENSIONS OF SIDE RAILS FOR TWO-SECTION LADDER**

Size of ladder, overall length (feet)	Rail		
	Thickness (inches)		Depth (inches)
<b>For group 2 woods</b>			
16	1 1/16	x	2
20	1 1/16	x	2 1/4
24	1 1/16	x	2 1/2
28	1 1/16	x	2 3/4
32	1 1/8	x	2 3/4
36	1 5/16	x	2 3/4
40	1 5/16	x	2 3/4
44	1 5/16	x	3
<b>For group 3 woods</b>			
16	1 1/8	x	2
20	1 1/8	x	2 1/4
24	1 1/8	x	2 1/2
28	1 1/8	x	2 3/4
32	1 5/16	x	2 3/4
36	1 5/16	x	3
40	1 3/8	x	3
44	1 3/8	x	3 1/4
48-52	1 3/8	x	3 3/4
56-60	1 5/8	x	3 3/4

- (iii) Ladders of this type shall have either straight sides slightly converging toward the top of each section, or shall have flaring sides at the bottom of the first (or bottom) section, with the top section having converging side rails to a width that shall be not less than 4 inches. Except for the top section, the minimum width between side rails shall be 11 inches.
- (A) Adjacent sections shall be jointed by means of a groove in the bottom end of each rail of the upper of the two sections setting firmly over extensions outside the side rails, of the topmost rung of the next lower section and, at the same time, a groove in the top end of each rail of the lower of the two sections setting firmly over the bottom rung, inside the side rails, of the section next above.
- (B) The distance between the two rungs (top-most rung of one section, bottom rung of the section next above) mentioned in WAC 296-24-78007 (3)(d)(iii)(A) shall not be less than 1 foot.
- (C) The fit between rail grooves and rungs mentioned in WAC 296-24-78007 (3)(d)(iii)(A) shall be such as to provide a good fit without binding or unnecessary play.

**WAC 296-24-78007 (Cont.)**

- (D) The grooved ends of the sections shall be reinforced with a metal plate of not less than 18-gauge (manufacturing standard) material properly secured thereto, and a rivet adjacent to the groove, extending through the depth of the rail, or the equivalent thereof.
- (e) Trestle and extension trestle ladder.
- (i) Trestle ladders, or extension sections or base sections of extension trestle ladders longer than 20 feet shall not be supplied.
- (ii) The minimum dimensions of the side rails of the trestle ladder, or the base sections of the extension trestle ladder, shall be as follows for Group 2 or Group 3 woods.

Length of ladder (feet)	Thickness (inches)	Depth (inches)
Up to and including 16	1 5/16	2 3/4
Over 16 up to and including 20	1 5/16	3

The minimum dimensions of the side rails of the extension section of the extension trestle ladder, which shall have parallel sides, shall be as follows for Group 2 or Group 3 woods.

Size of ladder (feet)	Thickness (inches)	Depth (inches)
Up to and including 12	1 5/16	2 1/4
Over 12 up to and including 16	1 5/16	2 1/2
Over 16 up to and including 20	1 5/16	2 3/4

- (iii) Trestle ladders and base sections of extension trestle ladders shall be so spread that when in an open position the spread of the trestle at the bottom, inside to inside, shall be at least 5 1/2 inches per foot of the length of the ladder.
- (iv) The width between the side rails at the base of the trestle ladder and the base sections of the extension trestle ladder shall be at least 21 inches for all ladders and sections up to and including 6 feet. Longer lengths shall be increased at least 1 inch for each additional foot of length. The width between the side rails of the extension sections of the trestle ladder shall be not less than 12 inches.
- (v) The tops of the side rails of the trestle ladder and of the base section of the extension trestle ladder shall be beveled or equivalent construction, and shall be provided further with a metal hinge to prevent spreading.
- (vi) A metal spreader or locking device to hold the front and back sections in an open position, and to hold the extension section securely in the elevated position, shall be a component of all extension trestle ladders and all trestle ladders over 12 feet in length.
- (vii) Rungs shall be parallel and level. On the trestle ladder, or on the base sections of the extension trestle ladder, rungs shall be spaced not less than 8 inches or more than 18 inches apart; on the extension section of the extension trestle ladder, rungs shall be spaced not less than 6 inches or more than 12 inches apart.
- (viii) Rungs. Rungs shall be of white oak, ash, hickory, or wood of equivalent strength not less than 1 1/8 inches in diameter with at least a 7/8 inch diameter tenon. Where the distance between side rails is more than 28 inches rungs shall be supported in the center. Holes

---

**WAC 296-24-78007 (Cont.)**

for wood rungs shall either extend through the side rails or be bored to give at least a 13/16 inch length of bearing to the rung tenon. In throughbored construction the rungs shall extend at least flush with the outside rail surface. Holes shall be located on the center line of the wide face of the side rails and shall be of such size as to be a tight fit for the rung. The shoulder of the rung shall be forced firmly against the side rails and the tenon secured in place with a nail, or the equivalent thereof, to prevent turning. A 3/16 inch diameter tie rod shall be placed under each rung.

- (4) Special-purpose ladders. All special-purpose ladders shall comply with the appropriate requirements of WAC 296-24-78007 (1), (2) and (3), except as hereinafter modified in this subsection.
- (a) Platform stepladder. A platform stepladder is a modification of a portable stepladder with a working platform provided near the top.
- (i) Platform stepladders shall be made in accordance with the requirements of Type I stepladders or in accordance with the requirements for Type II stepladders.
- (ii) The slope of the back section shall be such that a vertical from the back edge of the platform will strike the floor at a distance measured toward the front section of not less than 3 inches from the base of the back section.
- (iii) The minimum width between side rails at the platform shall be not less than 15 inches.
- (iv) The back legs and side rails shall extend at least 24 inches above the platform and shall be connected with a top member to form a three-sided rail, or equivalent construction shall be provided.
- (v) Platforms shall be so constructed as to be capable of supporting a load of 200 pounds placed at any point on the platform.
- (vi) A separate spreader may be omitted from platform ladders in which the height to the platform is 6 feet or less. If the spreader is omitted, the platform shall be so designed as to function as a spreader or locking device to hold the front and back sections securely in an open position, with the connection between side rails and back legs being through the metal parts of the platform. The wood parts of a combined wood and metal platform functioning as a spreader shall not be depended upon to contribute to the spreading or locking action.
- (b) Painter's stepladder.
- (i) Painter's stepladders longer than 12 feet shall not be supplied.
- (ii) Painter's stepladders shall be made in accordance with the requirements of Type II stepladders except for the following:
- (A) The top may be omitted.
- (B) A rope spreader may be substituted for the metal spreader required in WAC 296-24-78007 (2)(a)(vi). The rope shall not be less than No. 6 sash cord or its equivalent.

**WAC 296-24-78007 (Cont.)**

- (c) Mason's ladder. A mason's ladder is a special type of single ladder intended for use in heavy construction work.
  - (i) Mason's ladders longer than 40 feet shall not be supplied.
  - (ii) The minimum dimensions of the side rails when made of Group 2 or Group 3 woods and rungs (Group 1 woods) of the mason's ladder shall be as follows:

Length of ladder (feet)	Side rails		Diameter	
	Thickness (inches)	Depth (inches)	Rung (inches)	Tenon (inches)
Up to and including 22	1 5/8	3 5/8	1 3/8	1
Over 22 up to and including 40	1 5/8	4 1/2	1 3/8	1

- (iii) The width between the side rails at the bottom rung, inside to inside, shall not be less than 12 inches for all ladders up to and including 10 feet. Such minimum widths shall be increased by at least one-fourth inch for each additional 2 feet of length.
  - (iv) Rungs shall be parallel and level and shall be spaced not less than 8 inches or more than 12 inches apart.
- (5) Trolley and side-rolling ladders.
  - (a) Length. Trolley ladders and side-rolling ladders longer than 20 feet should not be supplied.
  - (b) Dimensions. The dimensions of the side rails shall not be less than the following for Group 2 or Group 3 woods.

Length of side rail (feet)	Thickness (inch)	Depth (inches)
Up to and including 10	3/4	3
Over 10 up to and including 20	3/4	3 3/4

The minimum thicknesses of side rails provide for the cutting of a groove not over one-eighth inch in depth and shall be increased when grooves of greater depth are used. Flat steps shall have the following minimum dimensions for Group 2 or Group 3 woods.

Length of side rail (feet)	Thickness (inch)	Depth (inches)
Up to and including 16	3/4	3
Over 16 up to and including 20	3/4	3 1/4
Over 20 up to and including 24	3/4	3 1/2
Over 24 up to and including 28	3/4	4

- (c) Width. The width between the side rails, inside to inside, shall be at least 12 inches.
- (d) Step attachment. Flat steps shall be inset in the side rails one-eighth inch and secured with at least two 6-d nails at each end or the equivalent thereof. They shall be reinforced with angle braces or a 3/16inch steel rod.
- (e) Locking device. Locking devices should be provided on all trolley ladders.

---

**WAC 296-24-78007 (Cont.)**

- (f) Tracks.
  - (i) Tracks shall be wood, or metal (excluding cast iron), or a combination of these materials.
  - (ii) Tracks for the top end of ladders shall be fastened securely and shall be so constructed that the wheels will not jump the track. Tracks shall be so designed as to provide for all probable loads to which they will be subjected.
  - (iii) The supports shall be securely fastened by the lag screws, machine, hook, or toggle bolts, or their equivalent.
  - (iv) Track for side-rolling ladders shall be supported by metal or wood brackets securely screwed or bolted to shelving or other permanent structure at not over 3 feet.
- (g) Wheel carriages.
  - (i) Wheel carriages shall be so designed as to provide for all loads to which they will be subjected. Two-point suspension should be used.
  - (ii) The wheel carriage for the top end of the ladder shall be securely fastened to the top of the ladder with metal brackets bolted either to the side rails or to the top step. When bolted to the top step, this step shall be secured to the side rails with metal braces in addition to those otherwise provided. The wheel carriage shall be so designed that a loose or broken wheel will not allow the ladder to drop or become detached from the track.
  - (iii) The wheel carriage for the bottom end of the ladder shall be securely fastened to the bottom of the ladder.
  - (iv) The wheels at the upper end of the ladder shall have minimum wheel base of 8 inches.
  - (v) When wheels are used at the bottom of the ladder, there shall be at least one wheel supporting each side rail.
  - (vi) Running gear for bottoms of both trolley and side-rolling ladders shall be so designed and constructed as to provide for any load to which they will be subjected.
- (6) Jacob's ladders. Portable type ladders fabricated with side rails of rope, wire, chain, etc., and having rigid rungs. Care and use shall be as follows:
  - (a) Jacob's ladders shall not be used in lengths longer than 30 feet.
  - (b) Side rails shall be fabricated from rope, metal bars, wire, chain, or material of substantial construction.
  - (c) Rungs shall be evenly spaced from 12 to 16 inches apart and not less than 16 inches in length.
  - (d) Rungs shall be fabricated from wood, metal, or other substantial construction and be securely fastened to the side rails.
  - (e) The assembled ladder and its means of suspension shall be capable of supporting a minimum of 500 pounds with a safety factor of 5 to 1, unless the side rails are of manila rope which requires a safety factor of 10 to 1.

---

**WAC 296-24-78007 (Cont.)**

- (f) Care and use of Jacob's ladders shall be in accordance with the applicable portions of WAC 296-24-78009.

[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-78007, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-78007, filed 5/9/73 and Order 73-4, § 296-24-78007, filed 5/7/73.]

**WAC 296-24-78009 Ladder tests.**

- (1) Ladders shall pass the following test:

When tested as a simple beam with a support under each end and the center rung loaded with a two hundred pound load, the ladder must support this load for ten minutes without permanent set and without showing any sign of failure. The maximum deflection shall not be greater than shown in the enclosed table.

Lengths of extended ladder in feet	Distance of supports from ends, in inches	Total deflection, in inches
12	3	2 3/4
16	3	6 3/4
20	3	11 1/2
24	3	16 1/2
28	3	21 1/2
30	3	23 1/2
34	6	26
36	6	29
40	6	37
44	9	41

**WAC 296-24-795 Portable metal ladders.**

[Order 73-5, § 296-24-795, filed 5/9/73 and Order 73-4, § 296-24-795, filed 5/7/73.]

**WAC 296-24-79501 Terms.** The following terms shall have the meaning ascribed in this section when referred to in WAC 296-24-79503 through 296-24-79507 unless the context requires otherwise.

- (1) **Ladder.** A ladder is an appliance usually consisting of two side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending.
- (2) **Step ladder.** A step ladder is a self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.
- (3) **Single ladder.** A single ladder is a nonself-supporting portable ladder, nonadjustable in length, consisting of but one section. Its size is designated by the overall length of the side rail.
- (4) **Extension ladder.** An extension ladder is a nonself-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.
- (5) **Platform ladder.** A self-supporting ladder of fixed size with a platform provided at the working level. The size is determined by the distance along the front rail from the platform to the base of the ladder.
- (6) **Sectional ladder.** A sectional ladder is a nonself-supporting portable ladder, nonadjustable in length, consisting of two or more sections so constructed that the sections may be combined to function as a single ladder. Its size is designated by the overall length of the assembled sections.



---

**WAC 296-24-79501 (Cont.)**

- (7) **Trestle ladder.** A trestle ladder is a self-supporting portable ladder, nonadjustable in length, consisting of two sections, hinged at the top to form equal angles with the base. The size is designated by the length of the side rails measured along the front edge.
- (8) **Extension trestle ladder.** An extension trestle ladder is a self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable single ladder, with suitable means for locking the ladders together. The size is designated by the length of the trestle ladder base.
- (9) **Special-purpose ladder.** A special-purpose ladder is a portable ladder which represents either a modification or a combination of design or construction features in one of the general-purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses.

[Order 73-5, § 296-24-79501, filed 5/9/73 and Order 73-4, § 296-24-79501, filed 5/7/73.]

**WAC 296-24-79503 Requirements.**

- (1) General. Specific design and construction requirements are not part of this section because of the wide variety of metals and design possibilities. However, the design shall be such as to produce a ladder without structural defects or accident hazards such as sharp edges, burrs, etc. The metal selected shall be of sufficient strength to meet the test requirements, and shall be protected against corrosion unless inherently corrosion-resistant.
  - (a) Because of the varied conditions, and the wide variety of ladder uses, ladders may be designed with parallel side rails, with side rails varying uniformly in separation along the length (tapered), or with side rails flaring at the base to increase stability.
  - (b) The design of the side rails shall be such as to insure a product which will conform to the requirements of this section.
  - (c) The spacing of rungs or steps shall be on 12-inch centers.
  - (d) Rungs or steps to side rail connections should be so constructed as to insure rigidity as well as strength.
  - (e) Rungs and steps shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping.
  - (f) Hardware shall meet strength requirements of the ladder's component parts, and shall be of a material that is protected against corrosion unless inherently corrosion-resistant. Metals shall be so selected as to avoid excessive galvanic action.
- (2) General specifications--Straight and extension ladders.
  - (a) The minimum width between side rails of a straight ladder or any section of an extension ladder shall be 12 inches.
  - (b) The length of single ladders or individual sections of ladders shall not exceed 30 feet. Two-section ladders shall not exceed 48 feet in length and over two-section ladders shall not exceed 60 feet in length.
  - (c) Based on the nominal length of the ladder, each section of a multisection ladder shall overlap the adjacent section by at least the number of feet stated in the following:

---

**WAC 296-24-79503 (Cont.)**

<b>Nominal length of ladder (feet):</b>	<b>(feet)</b>
Up to and including 36	3
Over 36, up to and including 48	4
Over 48, up to 60	5

- (d) Extension ladders shall be equipped with positive stops which will insure the overlap specified in the table above.
  - (e) Extension ladders may be equipped with a rope and pulley which shall be securely attached to the ladder in such a manner as not to weaken either the rungs or the side rails. The pulley shall be not less than 1 1/4 inches in diameter.
    - (i) The rope used with the pulley shall be not less than five-sixteenths inch in diameter, having a minimum breaking strength of 560 pounds, and shall be of sufficient length for the purpose intended.
- (3) General specifications-Step ladders.
- (a) Step ladders shall be designed and constructed to give a minimum slope of 3 1/2 inches per foot of length of the front section, and a minimum slope of 2 inches per foot of length of the back section, except that special ladders designed for straight-in-wall work shall maintain at least 1 1/4-inch back slope per foot of length.
  - (b) The minimum width between the side rails at the top step shall be 12 inches. The width spread of the side rails shall increase a minimum of 1 inch per foot of length. The width of the step or tread shall not be less than 3 inches.
  - (c) The length of a stepladder is measured by the length of the front rail. To be classified as a standard length ladder, the measured length shall be within plus or minus one-half inch of the specified length. Stepladders shall not exceed 20 feet in length.
  - (d) The pail shelf shall be designed to fold completely within the ladder.
  - (e) The back section may be designed with either rungs or cross bracing as long as it meets the general and testing requirements.
  - (f) Steps shall be corrugated, knurled, dimpled, coated with skid-resistant materials, or otherwise treated to minimize the possibility of slipping.
  - (g) The bottoms of the four rails are to be supplied with insulating nonslip material.
  - (h) A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in the open position shall be a component of each stepladder. The spreader shall have all sharp points or edges covered or removed.
- (4) General specifications-Trestles and extension trestle ladders.
- (a) Trestle ladders or extension sections or base sections of extension trestle ladders shall be not more than 20 feet in length.

---

**WAC 296-24-79503 (Cont.)**

- (b) The minimum distance between side rails of the trestle or extension section at the narrowest point shall not be less than 12 1/2 inches. The width spread shall not be less than 1 inch per foot of length of side rail.
  - (c) Spread of base when section is open shall not be less than 5 1/2 inches per foot of base section side rail.
  - (d) The extension locking device shall be designed to withstand all load tests.
  - (e) A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in the open position shall be a component of each trestle ladder. The spreader shall have all sharp points or edges covered or removed.
- (5) General specifications-Platform ladders.
- (a) The length of a platform ladder shall not exceed 20 feet. The length of a platform ladder shall be measured along the front rail from the floor to the platform.
  - (b) Minimum width between side rails at platform level shall be 14 inches. Width spread shall not be less than 1 inch per foot of rise.
  - (c) Slope of the front rail when unit is in open position shall not be less than 3 1/2 inches per foot of rise, and the back section shall have a minimum slope of 1 inch per foot of rise.
  - (d) The platform shall be at least 20 inches from the top of the ladder, and shall have an area of not less than 200 square inches nor more than 400 square inches.
  - (e) The back legs and side rails of a platform ladder shall extend at least 20 inches above the platform and shall be connected with the top member to form a three-sided top guard rail, or equivalent construction shall be provided.
  - (f) Spreaders shall be provided where the hinging apparatus is not designed to lock the unit open.

[Order 73-5, § 296-24-79503, filed 5/9/73 and Order 73-4, § 296-24-79503, filed 5/7/73.]

**WAC 296-24-79505 Testing.**

- (1) General. The following tests are intended to insure uniform testing methods for metal ladders.
- (2) Straight and extension ladders.
  - (a) Ladder inclined strength is measured by placing the ladder unit in a flat, horizontal position, supported 6 inches from the ends of the side rails. When testing extensions, the unit is opened to the required overlap. A load of 200 pounds is applied equally to the side rails at the center of the unit by means of a beam. The ladder must withstand this test with no permanent deformation or other visible weakening of the structure. This test is based on a 200-pound person using the ladder, set at 75 1/2° to the ground. With the person on the center rung, the component of the 200-pound weight at right angles to the ladder will be 50 pounds. Applying the load factor of 4, the test weight becomes 200 pounds.

---

**WAC 296-24-79505 (Cont.)**

- (b) Test unit need only be of sufficient length for test purposes and is to consist of the base and fly sections of an extension ladder with all the hardware or fittings attached. The ladder unit is placed in a vertical position and a downward load of 775 pounds equally distributed on the ends of the side rails of the upper portion of the test unit. The unit shall withstand this test with no permanent deformation or other visible weakening of the structure.
- (c) A test unit of at least three rungs is to be used from the maximum width portion of the ladder. A load of 800 pounds shall be applied to a 3 1/2-inch wide block resting on the center of the widest rung. A rung of 14 inches or less in length shall withstand this test with no permanent deformation or other visible weakening of the structure. A rung of more than 14 inches in length may have a permanent deflection of not more than one-eighth inch provided the rung cross section is not deformed and there is no other visible weakening of the structure.
- (d) With at least a three-rung test unit set in a vertical position, a load of 800 pounds shall be applied to a 3 1/2-inch wide block resting on the center rung as near to the side rail as possible. On removing the load, the unit must show no indication of failure in the fasteners attaching the rungs to the side rail.
- (e) The rung shall be so secured to the side rail that a torque load of 360 inch-pounds applied to the rung at a side rail shall cause no visible relative motion between the rung and the side rail.
- (f) With the ladder extended to its maximum working length, and resting horizontally on level supports located 6 inches from each end of the ladder, a weight of 50 pounds shall be suspended from one of the side rails midway between supports.

The deflection of the loaded rail, and the difference in deflection between the loaded and unloaded rails shall not exceed the values in Table D-6.

- (g) Deflections in Table D-6 are to be determined by measuring, at the midpoint between supports, the distance from the outside edges of both rails to the floor or other reference surface both before and after the test load of 50 pounds is applied to one rail of the ladder. The test is to be repeated loading the other rail of the ladder. The angle (a) between the loaded and unloaded rails and the horizontal is to be calculated from the trigonometric equation:

$$\text{Sine } a = \frac{\text{Difference in deflection}}{\text{Ladder width}}$$

**WAC 296-24-79505 (Cont.)**

**TABLE D-6  
TABLE OF DEFLECTIONS**

<b>Length of ladder in feet</b>	<b>Maximum deflection of loaded rail in inches</b>	<b>Maximum difference in deflection between loaded and unloaded rails in degrees from horizontal</b>
20	3.0	3.6
24	3.8	4.7
28	4.6	5.4
32	5.5	5.7
36	6.4	6.1
40	7.2	6.5
44	8.0	6.5
48	8.8	6.5

- (3) Step, trestle, extension trestle, and platform ladders.
- (a) Load test of the entire ladder is made with the ladder in an open position, and an 800-pound load applied to the center of the top. Resistance to side rail bending is tested by placing an 800-pound load on the center of the middle step. The strength of the step section is tested by applying an 800-pound load to a 3 1/2-inch-wide block resting on the center of the longest or bottom step. The pail shelf shall be so constructed as to support a distributed load of 50 pounds.
- (i) In each test case, the unit must withstand the load without failure or permanent deformation.
- (b) Set ladder in open position on a level floor. Place a 200-pound distributed load on the top step. The ladder is then subjected to a horizontal pulling load, applied at the top step, of 12-pound force to the side; 58-pound force to the front; 33-pound force to the back. In each test, all side rails must remain on the floor.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-79505, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-79505, filed 5/9/73 and Order 73-4, § 296-24-79505, filed 5/7/73.]

**WAC 296-24-810 Fixed ladders.**

[Order 73-5, § 296-24-810, filed 5/9/73 and Order 73-4, § 296-24-810, filed 5/7/73.]

**WAC 296-24-81001 Definitions.** The following terms shall have the meaning ascribed in this section when referred to in WAC 296-24-81003 through 296-24-81007 unless the context requires otherwise.

- (1) **Ladder.** A ladder is an appliance usually consisting of two side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending.
- (2) **Fixed ladder.** A fixed ladder is a ladder permanently attached to a structure, building, or equipment.
- (3) **Individual-rung ladder.** An individual-rung ladder is a fixed ladder each rung of which is individually attached to a structure, building, or equipment.
- (4) **Rail ladder.** A rail ladder is a fixed ladder consisting of side rails joined at regular intervals by rungs or cleats and fastened in full length or in sections to a building, structure, or equipment.

---

**WAC 296-24-81001 (Cont.)**

- (5) **Railings.** A railing is any one or a combination of those railings constructed in accordance with WAC 296-24-75003 through 296-24-75011. A standard railing is a vertical barrier erected along exposed edges of floor openings, wall openings, ramps, platforms, and runways to prevent falls of persons.
- (6) **Pitch.** Pitch is the included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side.
- (7) **Fastenings.** A fastening is a device to attach a ladder to a structure, building, or equipment.
- (8) **Rungs.** Rungs are ladder crosspieces of circular or oval cross-section on which a person may step in ascending or descending.
- (9) **Cleats.** Cleats are ladder crosspieces of rectangular cross-section placed on edge on which a person may step in ascending or descending.
- (10) **Steps.** Steps are the flat crosspieces of a ladder on which a person may step in ascending or descending.
- (11) **Cage.** A cage is a guard that may be referred to as a cage or basket guard which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder.
- (12) **Well.** A well is a permanent complete enclosure around a fixed ladder, which is attached to the walls of the well. Proper clearances for a well will give the person who must climb the ladder the same protection as a cage.
- (13) **Ladder safety device.** A ladder safety device is any device, other than a cage or well, designed to eliminate or reduce the possibility of accidental falls and which may incorporate such features as life belts, friction brakes, and sliding attachments.
- (14) **Grab bars.** Grab bars are individual handholds placed adjacent to or as an extension above ladders for the purpose of providing access beyond the limits of the ladder.
- (15) **Through ladder.** A through ladder is one from which a person getting off at the top must step through the ladder in order to reach the landing.
- (16) **Side-step ladder.** A side-step ladder is one from which a person getting off at the top must step sideways from the ladder in order to reach the landing.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-81001, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-81001, filed 5/9/73 and Order 73-4, § 296-24-81001, filed 5/7/73.]

**WAC 296-24-81003 Design requirements.**

- (1) Design considerations. All ladders, appurtenances, and fastenings shall be designed to meet the following load requirements:
  - (a) The minimum design live load shall be a single concentrated load of 200 pounds.
  - (b) The number and position of additional concentrated live-load units of 200 pounds each as determined from anticipated usage of the ladder shall be considered in the design.
  - (c) The live loads imposed by persons occupying the ladder shall be considered to be concentrated at such points as will cause the maximum stress in the structural member being considered.

---

**WAC 296-24-81003 (Cont.)**

- (d) The weight of the ladder and attached appurtenances together with the live load shall be considered in the design of rails and fastenings.
- (2) Design stresses.
  - (a) Design stresses for wood components of ladders shall not exceed those specified in WAC 296-24-78001 through 296-24-79507. All wood parts of fixed ladders shall meet the requirements of WAC 296-24-78005.
  - (b) For fixed ladders consisting of wood side rails and wood rungs or cleats, used at a pitch in the range 75 degrees to 90 degrees, and intended for use by no more than one person per section, single ladders as described in WAC 296-24-78007 (3)(b) are acceptable.
- (3) Fixed embedded steps. Individual fixed steps used for access or egress, embedded in the walls of risers or the conical top sections of manholes shall be safe, well constructed, and installed in accordance with good engineering practices. Appurtenances penetrating the manhole walls are prohibited.

[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-81003, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-81003, filed 5/9/73 and Order 73-4, § 296-24-81003, filed 5/7/73.]

**WAC 296-24-81005 Specific features.**

- (1) Rungs and cleats.
  - (a) All rungs shall have a minimum diameter of three-fourths inch for metal ladders, except as covered in subsection (7)(a) of this section, and a minimum diameter of 1 1/8 inches for wood ladders.
  - (b) The distance between rungs, cleats, and steps shall not exceed 12 inches and shall be uniform throughout the length of the ladder.
  - (c) The minimum clear length of rungs or cleats shall be 16 inches.
  - (d) Rungs, cleats, and steps shall be free of splinters, sharp edges, burrs, or projections which may be a hazard.
  - (e) The rungs of an individual-rung ladder shall be so designed that the foot cannot slide off the end (A suggested design is shown in Figure D-1, at the end of this section) or be treated with anti-slip type paint or treatment.
  - (f) Such rungs or steps installed in the walls of risers or conical top sections of manholes shall be uniformly spaced from 12 inches to 16 1/2 inches apart and be a minimum of 10 inches in length.
    - (i) The manhole rungs or steps shall have a minimum of 4 inches of clearance between the rung or step and the wall.
    - (ii) The manhole rung or step shall be capable of sustaining a single concentrated load of 300 pounds.
- (2) Side rails. Side rails which might be used as a climbing aid shall be of such cross sections as to afford adequate gripping surface without sharp edges, splinters, or burrs.

---

**WAC 296-24-81005 (Cont.)**

- (3) Fastenings. Fastenings shall be an integral part of fixed ladder design.
- (4) Splices. All splices made by whatever means shall meet design requirements as noted in WAC 296-24-81003(1). All splices and connections shall have smooth transition with original members and with no sharp or extensive projections.
  - (a) When fixed ladders are spliced the splice plates shall be the same depth as side rails.
  - (b) The length of the splice plates shall be four times the depth of the side rail. They shall be of metal not less than one-fourth of an inch in thickness and chamfered on all exposed edges.
  - (c) Splice plates shall be secured by bolts or rivets with the heads countersunk or of the button type.
  - (d) The heads shall be on the outside of the rail.
  - (e) The bolts or rivets shall be not less than one-half inch nor more than five-eighths inch in diameter.
  - (f) The bolt ends shall be chamfered with only the chamfered end extending beyond the nut.
  - (g) Both ends of the rivet shall be button shape.
  - (h) Washers shall be placed under the nuts and rivet ends on wood side rails.
  - (i) There shall be a minimum of three bolts or rivets on each side of the joint for metal side rails and a minimum of four bolts or rivets for wood side rails.
  - (j) Bolts and rivets in both metal and wood side rails shall be staggered in position.
- (5) Electrolytic action. Adequate means shall be employed to protect dissimilar metals from electrolytic action when such metals are joined.
- (6) Welding. All welding shall be in accordance with the "Code for Welding in Building Construction" (AWS D1.0-1966).
- (7) Protection from deterioration.
  - (a) Metal ladders and appurtenances shall be painted or otherwise treated to resist corrosion and rusting when location demands. Ladders formed by individual metal rungs imbedded in concrete, which serve as access to pits and to other areas under floors, are frequently located in an atmosphere that causes corrosion and rusting. To increase rung life in such atmosphere, individual metal rungs shall have a minimum diameter of 1 inch or shall be painted or otherwise treated to resist corrosion and rusting.
  - (b) Wood ladders, when used under conditions where decay may occur, shall be treated with a nonirritating preservative, and the details shall be such as to prevent or minimize the accumulation of water on wood parts.
  - (c) When different types of materials are used in the construction of a ladder, the materials used shall be so treated as to have no deleterious effect one upon the other.

[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-81005, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-81005, filed 5/9/73 and Order 73-4, § 296-24-81005, filed 5/7/73.]



---

**WAC 296-24-81007 Clearance.**

- (1) Climbing side. On fixed ladders, the perpendicular distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be 36 inches for a pitch of 76 degrees, and 30 inches for a pitch of 90 degrees (Fig. D-2 of this section), with minimum clearances for intermediate pitches varying between these two limits in proportion to the slope, except as provided in (3) and (5) of this section.
- (2) Ladders without cages or wells. A clear width of at least 15 inches shall be provided each way from the centerline of the ladder in the climbing space, except when cages or wells are necessary.
- (3) Ladders with cages or baskets. Ladders equipped with cage or basket are excepted from the provisions of (1) and (2) of this section, but shall conform to the provisions of WAC 296-24-81009 (1)(e). Fixed ladders in smooth-walled wells are excepted from the provisions of (1) of this section, but shall conform to the provisions of WAC 296-24-81009 (1)(f).
- (4) Clearance in back of ladder. The distance from the centerline of rungs, cleats, or steps to the nearest permanent object in back of the ladder shall be not less than 7 inches, except that when unavoidable obstructions are encountered, minimum clearances as shown in Figure D-3 shall be provided.
- (5) Clearance in back of grab bar. The distance from the centerline of the grab bar to the nearest permanent object in back of the grab bars shall be not less than 4 inches. Grab bars shall not protrude on the climbing side beyond the rungs of the ladder which they serve.
- (6) Step-across distance. The step-across distance from the nearest edge of ladder to the nearest edge of equipment or structure shall be not more than 12 inches, or less than 2 1/2 inches (Fig. D-4).
- (7) Hatch cover. Counterweighted hatch covers shall open a minimum of 60 degrees from the horizontal. The distance from the centerline of rungs or cleats to the edge of the hatch opening on the climbing side shall be not less than 24 inches for offset wells or 30 inches for straight wells. There shall be no protruding potential hazards within 24 inches of the centerline of rungs or cleats; any such hazards within 30 inches of the centerline of the rungs or cleats shall be fitted with deflector plates placed at an angle of 60 degrees from the horizontal as indicated in Figure D-5. The relationship of a fixed ladder to an acceptable counterweighted hatch cover is illustrated in Figure D-6.

[Order 73-5, § 296-24-81007, filed 5/9/73 and Order 73-4, § 296-24-81007, filed 5/7/73.]

**WAC 296-24-81009 Special requirements.**

- (1) Cages or wells.
  - (a) Cages or wells (except on chimney ladders) shall be built, as shown on the applicable drawings, covered in detail in Figures D-7, D-8, and D-9, or of equivalent construction.
  - (b) Cages or wells (except as provided in (5) of this section) conforming to the dimensions shown in Figures D-7, D-8, and D-9 shall be provided on ladders of more than 20 feet to a maximum unbroken length of 30 feet.
  - (c) Cages shall extend a minimum of 42 inches above the top of landing, unless other acceptable protection is provided.
  - (d) Cages shall extend down the ladder to a point not less than 7 feet nor more than 8 feet above the base of the ladder, with bottom flared not less than 4 inches, or portion of cage opposite ladder shall be carried to the base.

---

**WAC 296-24-81009 (Cont.)**

- (e) Cages shall not extend less than 27 nor more than 28 inches from the centerline of the rungs of the ladder. Cage shall not be less than 27 inches in width. The inside shall be clear of projections. Vertical bars shall be located at a maximum spacing of 40 degrees around the circumference of the cage; this will give a maximum spacing of approximately 9 1/2 inches, center to center.
  - (f) Ladder wells shall have a clear width of at least 15 inches measured each way from the centerline of the ladder. Smooth-walled wells shall be a minimum of 27 inches from the centerline of rungs to the well wall on the climbing side of the ladder. Where other obstructions on the climbing side of the ladder exist, there shall be a minimum of 30 inches from the centerline of the rungs.
- (2) Landing platforms. When ladders are used to ascend to heights exceeding 20 feet (except on chimneys), landing platforms shall be provided for each 30 feet of height or fraction thereof, except that, where no cage, well, or ladder safety device is provided, landing platforms shall be provided for each 20 feet of height or fraction thereof. Each ladder section shall be offset from adjacent sections. Where installation conditions (even for a short, unbroken length) require that adjacent sections be offset, landing platforms shall be provided at each offset.
- (a) Where a person has to step a distance greater than 12 inches from the centerline of the rung of a ladder to the nearest edge of structure or equipment, a landing platform shall be provided. The minimum step-across distance shall be 2 1/2 inches.
  - (b) All landing platforms shall be equipped with standard railings and toeboards, so arranged as to give safe access to the ladder. Platforms shall be not less than 24 inches in width and 30 inches in length.
  - (c) One rung of any section of ladder shall be located at the level of the landing laterally served by the ladder. Where access to the landing is through the ladder, the same rung spacing as used on the ladder shall be used from the landing platform to the first rung below the landing.
- (3) Ladder extensions. The side rails of through or side-step ladder extensions shall extend 3 1/2 feet above parapets and landings. For through ladder extensions, the rungs shall be omitted from the extension and shall have not less than 18 nor more than 24 inches clearance between rails. For side-step or offset fixed ladder sections, at landings, the side rails and rungs shall be carried to the next regular rung beyond or above the 3 1/2 feet minimum (Fig. D-10).
- (4) Grab bars. Grab bars shall be spaced by a continuation of the rung spacing when they are located in the horizontal position. Vertical grab bars shall have the same spacing as the ladder side rails. Grab-bar diameters shall be the equivalent of the round-rung diameters.
- (5) Ladder safety devices. Ladder safety devices may be used on tower, water tank, and chimney ladders over 20 feet in unbroken length in lieu of cage protection. No landing platform is required in these cases. All ladder safety devices such as those that incorporate lifelines, friction brakes, and sliding attachments shall meet the design requirements of the ladders which they serve.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-81009, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-81009, filed 5/9/73 and Order 73-4, § 296-24-81009, filed 5/7/73.]

**WAC 296-24-81011 Pitch.** Preferred pitch.

- (1) The preferred pitch of fixed ladders shall be considered to come in the range of 75 degrees and 90 degrees with the horizontal (Fig. D-11).

---

**WAC 296-24-81011 (Cont.)**

- (2) Substandard pitch. Fixed ladders shall be considered as substandard if they are installed within the substandard pitch range of 60 and 75 degrees with the horizontal. Substandard fixed ladders are permitted only where it is found necessary to meet conditions of installation. This substandard pitch range shall be considered as a critical range to be avoided, if possible.
- (3) Scope of coverage in this section. This section covers only fixed ladders within the pitch range of 60 degrees and 90 degrees with the horizontal.
- (4) Pitch greater than 90 degrees. Ladders having a pitch in excess of 90 degrees with the horizontal are prohibited.

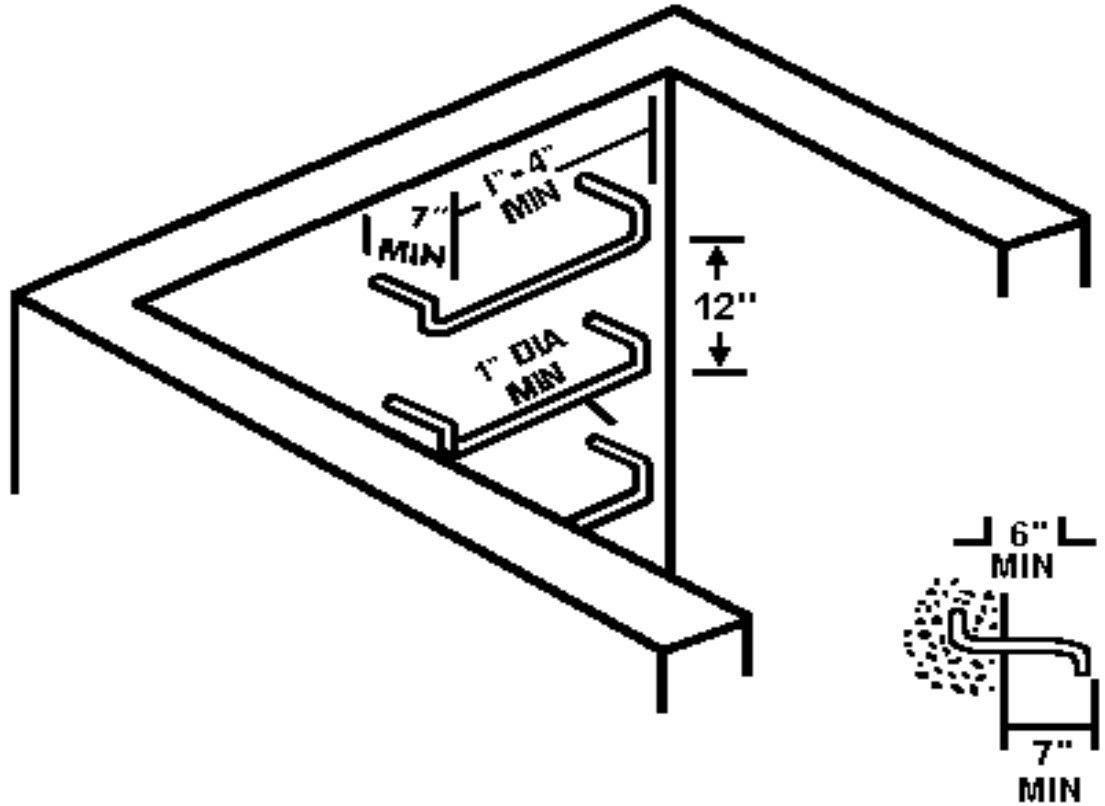
[Statutory Authority: RCW 49.17.040, 49.17.050, 49.17.240, chapters 43.22 and 42.30 RCW. 80-17-015 (Order 80-21), § 296-24-81011, filed 11/13/80; Order 73-5, § 296-24-81011, filed 5/9/73 and Order 73-4, § 296-24-81011, filed 5/7/73.]

**WAC 296-24-81013 Maintenance and use.**

- (1) All ladders shall be maintained in a safe condition. All ladders shall be inspected regularly, with the intervals between inspections being determined by use and exposure.

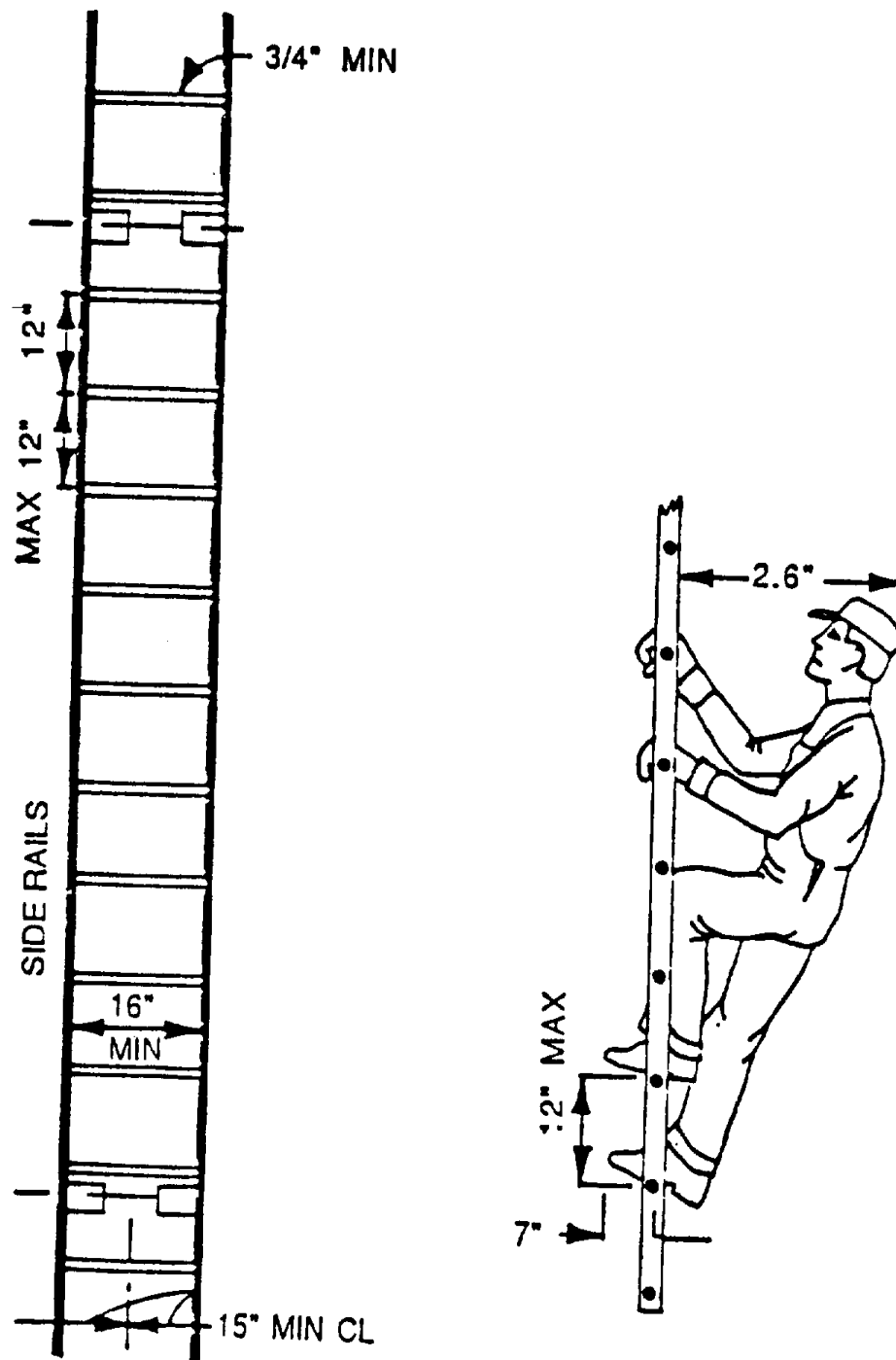
*Note: For illustrations, see Figs. D-1 through D-11.*

WAC 296-24-81013 (Cont.)



**Figure D-1**  
Suggested design for rungs on  
individual-rung ladders

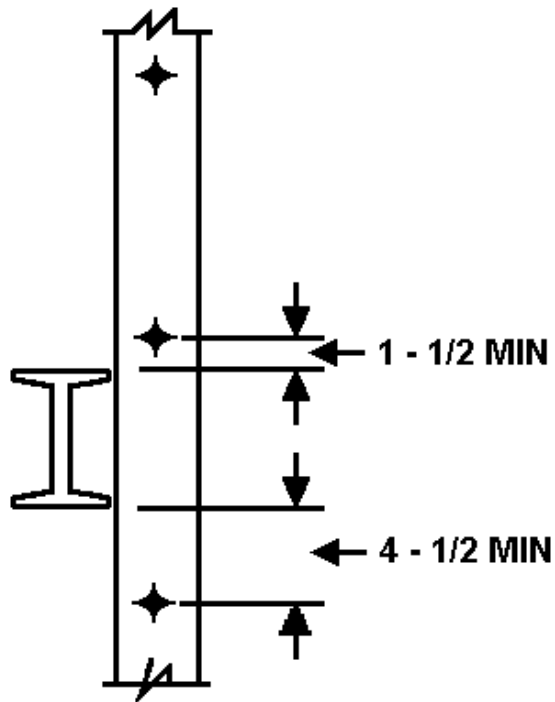
WAC 296-24-81013 (Cont.)



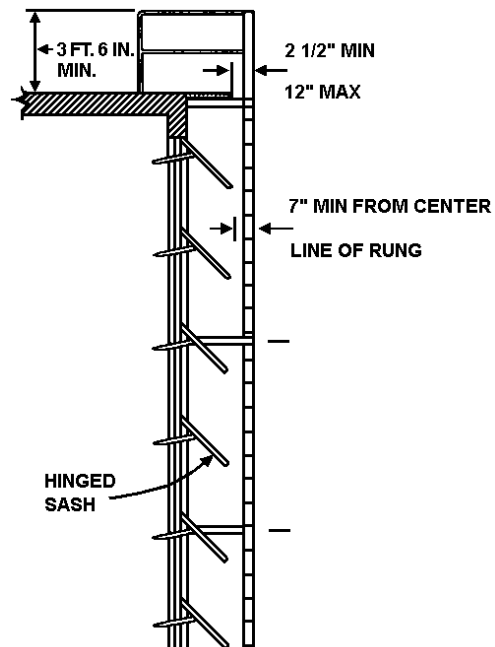
RAIL LADDER WITH BAR STEEL RAILS AND ROUND STEEL RUNGS

**Figure D-2**  
Minimum Ladder Clearances

WAC 296-24-81013 (Cont.)



**Figure D-3**  
Clearance for Unavoidable Obstruction at Rear of Fixed Ladder

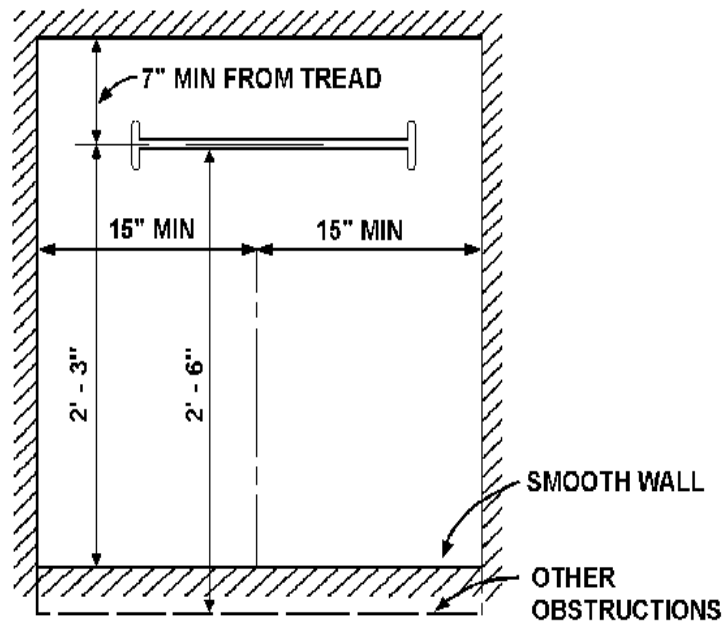


**Figure D-4**  
Ladder Far from Wall

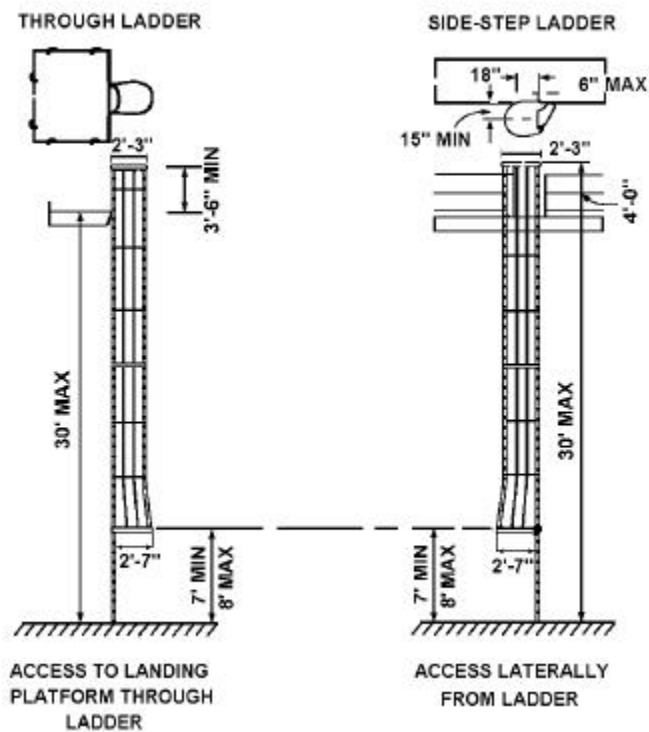
The image contains two technical drawings of a scissor lift. The left drawing, labeled 'SECTION A-4', is a cross-section showing the lift's base and internal components. It includes labels for 'COUNTERWEIGHT', 'MIN WHEN OPEN 60°', '2' - 6"', 'CATCH OR LOCKING DEVICE', '3' - 1"', and '7" MIN FROM RUNG'. The right drawing, labeled 'SECTIONAL ELEVATION', shows the lift's profile with dimensions '2' - 2" ±' and '2' - 6"', and section markers 'A' at the top and bottom.

Part J-1, Page 47  
07/01 Issue

WAC 296-24-81013 (Cont.)



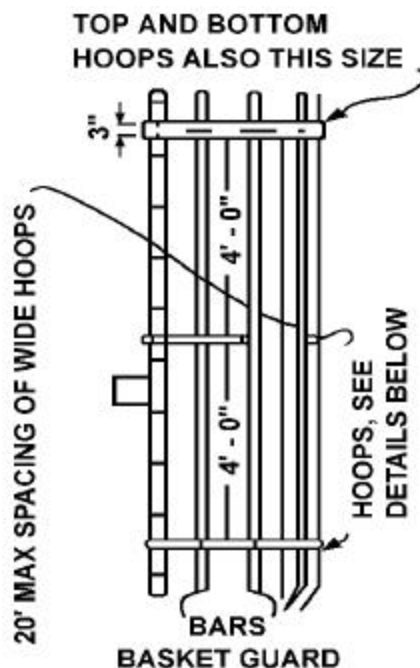
**Figure D-7**  
Clearance Diagram for Fixed Ladder in Well



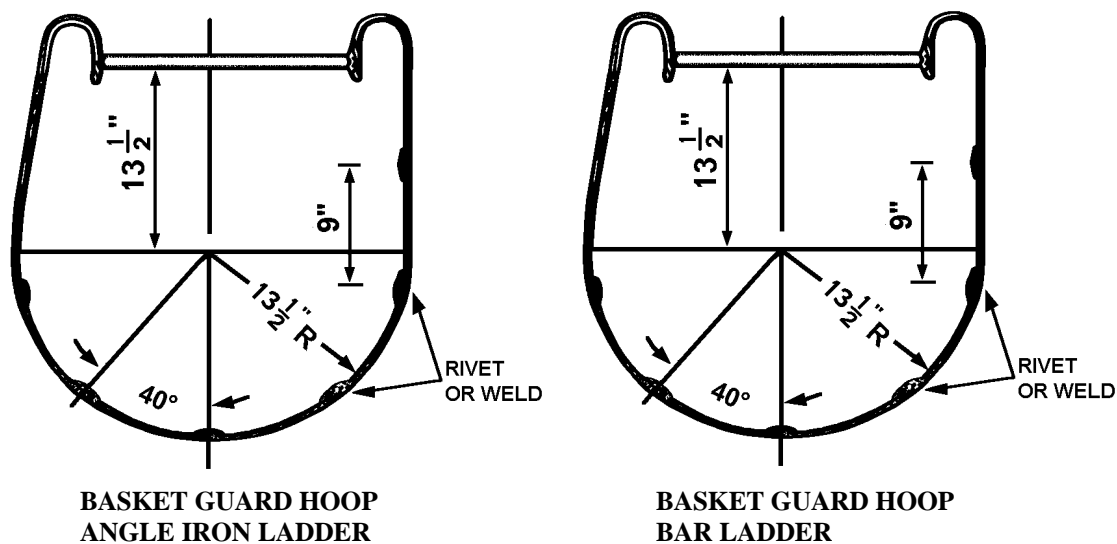
**Figure D-8 (Part 1)**



WAC 296-24-81013 (Cont.)

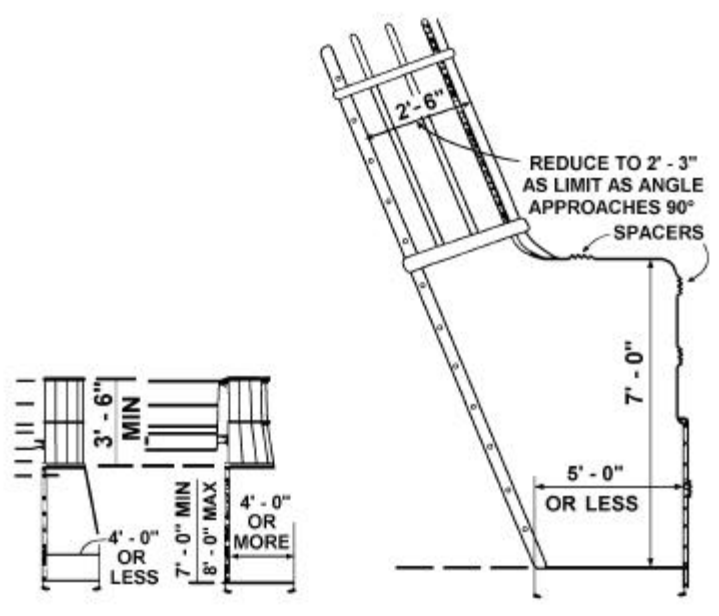


**Figure D-8 (Part 2)**  
Clearance for Unavoidable Obstruction at Rear of Fixed Ladder

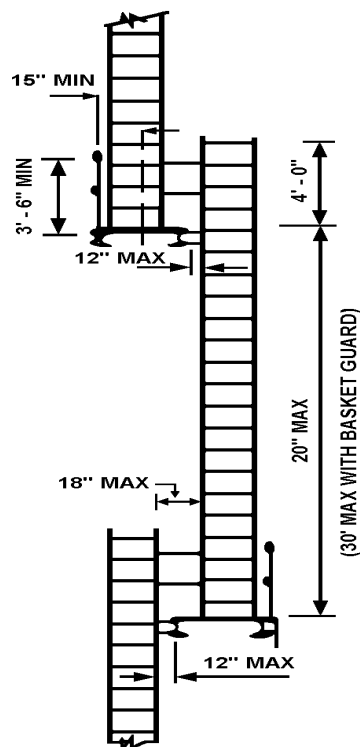


**Figure D-8 (Part 3)**  
Cages for Ladders more than 20 Feet High

WAC 296-24-81013 (Cont.)

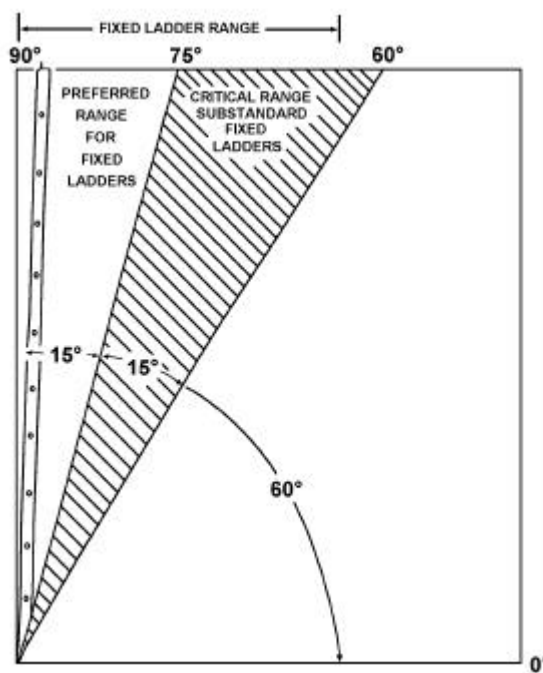


**Figure D-9**  
Cages--Special Applications



**Figure D-10**  
Offset Fixed Ladder Sections

**WAC 296-24-81013 (Cont.)**



**Figure D-11**  
Pitch of Fixed Ladders

- (2) When ascending or descending, the climber must face the ladder.
- (3) Workers shall not ascend or descend ladders while carrying tools or materials which will interfere with the free use of both hands.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-81013, filed 7/20/94, effective 9/20/94; Order 76-6, § 296-24-81013, filed 3/1/76; Order 73-5, § 296-24-81013, filed 5/9/73 and Order 73-4, § 296-24-81013, filed 5/7/73.]

**WAC 296-24-855 Other working surfaces.**

[Order 73-5, § 296-24-855, filed 5/9/73 and Order 73-4, § 296-24-855, filed 5/7/73.]

**WAC 296-24-85501 Dockboards (bridge plates).**

- (1) Portable and powered dockboards shall be strong enough to carry the load imposed on them.
- (2) Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping.
- (3) Powered dockboards shall be designed and constructed in accordance with Commercial Standard CS202-56 (1961) "Industrial Lifts and Hinged Loading Ramps" published by the U.S. Department of Commerce.
- (4) Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling.
- (5) Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

[Order 73-5, § 296-24-85501, filed 5/9/73 and Order 73-4, § 296-24-85501, filed 5/7/73.]

---

**WAC 296-24-85503 Forging machine area.**

- (1) Machines shall be so located as to give (a) enough clearance between machines so that the movement of one operator will not interfere with the work of another, (b) ample room for cleaning machines and handling the work, including material and scrap. The arrangement of machines shall be such that operators will not stand in aisles.
- (2) Aisles shall be provided of sufficient width to permit the free movement of employees bringing and removing material. This aisle space is to be independent of working and storage space and should be defined by marking.
- (3) Wood platforms used on the floor in front of machines shall be substantially constructed with nonslip surfaces.

[Statutory Authority: RCW 49.17.040, 49.17.150, and 49.17.240. 79-08-115 (Order 79-9), § 296-24-85503, filed 7/31/79; Order 73-5, § 296-24-85503, filed 5/9/73 and Order 73-4, § 296-24-85503, filed 5/7/73.]

**WAC 296-24-85505 Veneer machinery.**

- (1) Sides of steam vats shall extend to a height of not less than 36 inches above the floor, working platform, or ground.
- (2) Large steam vats divided into sections shall be provided with substantial walkways between sections. Each walkway shall be provided with a standard handrail on each exposed side. These handrails may be removable, if necessary.
- (3) Covers shall be removed only from that portion of steaming vats on which people are working and a portable railing shall be placed at this point to protect the operators.
- (4) Workers shall not ride or step on logs in steam vats.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-85505, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-85505, filed 5/9/73 and Order 73-4, § 296-24-85505, filed 5/7/73.]